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## THE DURHAM MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Edited by DR. F. R. MOULTON

PERMANENT SECRETARY

FROM June 23 to June 28 the American Association for the Advancement of Science held its one hundred eighth meeting at Durham, N. H., in connection with the celebration of the seventy-fifth anniversary of the founding of the University of New Hampshire. All the scientific sessions were held in the university buildings, which were conveniently located and excellently equipped. Most of the persons attending the meeting secured sleeping accommodations in the dormitories of the university. The special committees on arrangements were members of the university staff. At the close of the general session on the first evening the university tendered a reception to the association and its guests, and on the fourth evening

the university entertained the scientists with a concert at which Haydn's oratorio, "The Creation," was rendered by the New Hampshire Youth Orchestra under the direction of Professor Bjornar Bergethon. To an exceptional degree the university was an efficient and gracious host to the association.

At the Durham meeting six sections and twenty-one affiliated and associated societies presented programs or participated in joint programs. In addition to two general sessions of the association, the sections and participating societies held 49 sessions at which 210 formal papers were presented. Besides these formal sessions, there were several round-table discussions, eleven luncheons and dinners at most of

which addresses were delivered, thirty-four tours and excursions for scientific purposes, five demonstrations and exhibits and exhibitions of one or more of nineteen motion pictures on scientific subjects every afternoon during the meeting. Since nearly every room used for scientific sessions had to be provided with screens, projection apparatus and operators, and since precise arrangements had to be made for every luncheon, exhibit, dinner, demonstration and excursion, the duties of the local committee were heavy. Under the general chairmanship of W. C. O'Kane, Harry West was in charge of providing lanterns and screens, John C. Rowell looked after housing on the campus and in hotels of neighboring towns, J. T. Kangas assisted the press in obtaining material for reports of the meeting for the daily papers, Samuel Stevens arranged for transportation, Marion Beckwith supervised preparations for recreation and entertainment and E. H. Stolworthy cared for the exhibits.

#### REGISTRATION

It is estimated that about 1,000 persons attended one or more sessions of the meeting, of whom 322 registered and received copies of the general program, a book of 60 pages. The general program not only contains the details of every session but is a condensed summary of the activities of the meeting which is often useful for future reference. After meetings of the association have adjourned the office of the permanent secretary supplies to members, free of charge, copies of the general programs, upon request, until they are exhausted.

The distribution by states of the registrants at the Durham meeting was as follows: California, 1; Colorado, 1; Connecticut, 23; Delaware, 2; District of Columbia, 13; Florida, 2; Illinois, 6; Indiana, 3; Iowa, 1; Kansas, 2; Maine, 19; Maryland, 6; Massachusetts, 70; Michigan, 7; Minnesota, 1; Montana, 1; Nebraska, 1; New Hampshire, 34; New Jersey, 11; New York, 46; North Carolina, 1; Ohio, 9; Pennsylvania, 23; Rhode Island, 8; South Carolina, 1; Vermont, 23, and Wisconsin, 1. In addition, there were 6 registrants from Canada, making a total registration of 322.

#### SCIENTIFIC SESSIONS

##### SECTION ON MATHEMATICS (A)

(From report by T. R. Hollcroft, secretary pro tem.)

The section held two sessions, at each of which two papers were presented, followed by discussions. At the first session, H. L. Slobin, presiding, Norbert Wiener delivered an address on "Statistical Mechanics," in which he presented results achieved jointly by himself and Aurel Wintner. He explained a means of deducing a measure in the space of distribution of

points, such as the molecules of a gas, from density functions of  $n$ -ads of such particles. The second address at the first session, by Deane Montgomery on "Topological Transformation Groups in Euclidean Spaces," was a summary of recent results on finite groups of homeomorphisms obtained by Neuman and Smith and on transformation groups by Montgomery and Zippin.

At the second session, C. R. Adams presiding, Garrett Birkhoff delivered an address on "Vector Lattices," in which he used order in place of distance in defining the properties of function spaces, at least for the notions of boundedness, completeness, convergence, linear transformations and conjugate spaces. The final paper of the program of the section was by D. C. Lewis, Jr., on "Some Recent Researches on the Coloring of Maps." The number of ways a map can be colored in  $\lambda$  colors is a polynomial in  $\lambda$  called the *chromatic polynomial* associated with the map. It was shown that there are more appropriate methods of studying chromatic polynomials than the Kempe chain method, and that the Kempe chain method may be modified so as to give quantitative, as well as qualitative, results.

##### AMERICAN METEOROLOGICAL SOCIETY

(From report by Charles F. Brooks, secretary)

At the two sessions of the society on Wednesday, June 25, twelve papers were presented which together constituted a fairly complete discussion of the climate of New England in all its phases. A number of new studies were presented, including work being carried out on Mount Washington. Papers were presented by D. L. Arenberg, H. I. Baldwin, A. C. Bemis, A. E. Bent, C. F. Brooks, D. H. Chapman, J. H. Conover, V. A. Conrad, K. O. Lange and E. Sable. The society conducted an excursion to the summit of Mount Washington to visit the meteorological observatory maintained there. Attendance, 40.

##### SECTION ON GEOLOGY AND GEOGRAPHY (E) AND GEOLOGICAL SOCIETY OF AMERICA

(From report by Allyn C. Swinnerton, secretary)

The section and the society held three joint sessions for the presentation of twenty-five papers and conducted two field excursions. The program was organized by Howard A. Meyerhoff, retiring secretary of the section, and W. Elmer Ekblaw, representing the Association of American Geographers. The University of New Hampshire, through its department of geology, joined in sponsoring both the sessions for presenting papers and the field excursions. About 140 persons attended the sessions or participated in the excursions.

On Monday afternoon, June 23, nine papers were



presented on the "Bed-Rock Geology of Northern New England," ranging geographically from Maine to Vermont and from the Canadian border to northern Massachusetts. Three of the papers were preparatory for the White Mountains excursion.

On Tuesday morning seven papers dealt with "Recent Glacial Research in New England," and with recent coastal changes. The Tuesday afternoon sequence of papers presented the many sides of New England's geographic problems from mineral resources to recreational facilities, from soil conservation and grassland vs. forest economy to village planning.

On Wednesday a party of 54, under the leadership of G. W. White, A. S. Carlson, D. H. Chapman and J. W. Goldthwait, examined the geographic and glacial features of the Coheco valley, the coastal lowland and the shore features in the vicinity of Durham. Considerable discussion was provoked on the subjects of the building of the kame terraces and the nature of the glacial recession.

A cavalcade of 22 automobiles, carrying over 60 persons, left Durham on Thursday morning to begin a three-day geological excursion through the White Mountains. The ring-dike structures of the Belknap and Ossipee Mountains were examined on the first day under the direction of M. P. Billings and A. W. Quinn. On Friday the party ascended Mount Washington. During the day R. P. Goldthwait pointed out the glacial features, and under Billings's direction the mountain-forming Littleton schist was examined. Later in the day the rocks on the east and north sides of Mt. Washington were studied. On Saturday, under the direction of C. A. Chapman and Katharine Fowler-Billings and with the assistance of R. W. Chapman, the party, still numbering over 50, investigated the Ordovician and later meta-sediments and the dome structures of the Oliverian magma series on the western flank of the White Mountains. A worthwhile feature of the excursion was the informal conferences on Thursday and Friday evenings, at which the discussions ranged from the mechanics of intrusion of ring-dikes and magma sheets and domes to the deformation and metamorphism of the rocks of the White Mountains.

The three-day excursion afforded an opportunity to view systematically and intelligently one of the most complicated mountain structures in the world, and the large party expressed unanimous and enthusiastic approval of the tour. The success of the field trip can be attributed largely to the careful planning of the geological itinerary by M. P. Billings and to the arrangements for accommodations made by G. W. White.

#### AMERICAN ASSOCIATION OF ECONOMIC ENTOMOLOGISTS

(From report by Ernest N. Cary, secretary)

The society presented a symposium on "Laboratory Procedures in Studies of the Chemical Control of Insects" in four sessions on Wednesday and Thursday, June 25-26, at which eleven formal papers were presented, each paper being followed by formal and informal discussions. The first paper of the symposium was an introduction of its whole subject by W. C. O'Kane, followed by discussions of three topics on "Rearing Test Insects," the leaders of which were H. A. Waters, H. H. Shepard and F. L. Campbell. The second session consisted of discussions of "Stomach Insecticides" and "Contact Insecticides, including Ovicides," the leaders of which were Roy Hansbury and C. H. Richardson. For the third session the subjects were "Fumigants" and "Aerosols." The leader of the discussions of the former of these subjects was R. T. Cotton; the leaders for the latter were L. D. Goodhue and W. N. Sullivan. The subjects for the final session were "Fabric Protectors," "Attractants and Repellants" and "Termite Soil Poisons." The leaders of the discussions of these subjects were, respectively, F. W. Fletcher, V. G. Dether and W. E. McCauley. Attendance, about 130.

#### BOTANICAL SOCIETY OF AMERICA

On Tuesday evening, June 24, the systematic section of the society held a joint session with the American Society of Plant Taxonomists for a round-table discussion of "The Floras of Northeastern North America" under the leadership of W. H. Camp. On Wednesday afternoon the physiological section of the society joined with the American Society of Plant Physiologists in a round-table discussion of "Auxins and their Relation to Growth in Plants." The leaders in the discussions were Kenneth V. Thimann, Folke K. Skoog and George S. Avery, Jr. On Wednesday the societies joined with other societies in a dinner for all botanists.

#### AMERICAN PHYTOPATHOLOGICAL SOCIETY

(From report by Frank L. Howard, secretary)

The society held ten sessions, three for the presentation of formal papers and the remainder for tours and inspections of laboratories and experiment stations. The meeting of the society began on Tuesday, June 24, with a visit to Bartlett Tree Research Laboratories, Stamford, Conn., with a program which consisted partly of papers and partly of demonstrations, followed by a complimentary dinner by the Bartlett Company. On Tuesday afternoon the society made a tour of Yale University. In the evening the

Connecticut Agricultural Experiment Station in New Haven held open house, under the leadership of J. G. Horsfall, to the society and its guests. After an address of welcome by W. L. Slate the new greenhouses and their equipment and work were exhibited.

On Wednesday morning the society divided into two sections, the first of which made a tour of the Forest Pathology Laboratory of the U. S. Department of Agriculture, the Yale Forestry School, an example of forest fire damage, and the researches of A. H. Graves on chestnut blight. The second section inspected chemotherapy for Dutch elm disease, organic fungicides for apple scab, and a new type of power duster at the Experiment Station Farm at Mt. Carmel, Conn. After a luncheon at Sleeping Giant State Park, the society, under the leadership of P. J. Anderson, made a tour of the Tobacco and Vegetable Substation at Windsor, Conn., and examined demonstration plats for control of cabbage club root. The evening was devoted to a business meeting of the society, a session for the presentation of short papers and a discussion of tobacco diseases and insects.

On Thursday morning the society made a tour through shade tobacco fields of Windsor, Conn., and vicinity, after which it proceeded to Waltham, Mass., where it had luncheon in the perennial garden of the Field Station. The afternoon was spent, under the leadership of E. F. Guba, in inspecting gardens and witnessing demonstrations of means of controlling various plant diseases, after which the society drove to Durham, N. H. On Friday the society joined with the horticulturists in inspecting the laboratories and greenhouses of the departments of botany and horticulture of the University of New Hampshire and in a field trip to the horticultural farm. Attendance, from 20 to 130.

Officers of the New England Division of the society were elected as follows: *President*, B. F. Lutman; *Vice-President*, Emil F. Guba; *Secretary-Treasurer*, M. C. Richards; *Councilor*, Frank L. Howard.

#### AMERICAN SOCIETY OF PLANT PHYSIOLOGISTS

The society participated in the dinner for all botanists on Wednesday evening, June 25, and on Thursday held two sessions, the second of which was a joint session with Horticulturists of New England and Eastern Canada. A business meeting of the society was held at the beginning of the morning session, after which six papers on various subjects were presented. The afternoon program consisted of six papers.

#### TORREY BOTANICAL CLUB

(From report by John A. Small, chairman of field committee)

The program of the society consisted entirely of

field trips beginning on Sunday morning, June 22, and closing on Friday, July 4. On the morning of the first day about 75 members of the society ascended Mt. Monadnock and in the afternoon, under the guidance of H. I. Baldwin, visited the Caroline A. Fox Research and Demonstration Forest at Hillsboro, N. H. On Monday afternoon the society joined with the Ecological Society of America, under the leadership of C. F. Jackson and Albion Hodgdon, in a trip to Spruce Hole and Cedar Swamp. On Tuesday the same societies joined under the same leadership in a trip for the study of York County (Maine) flora. On Wednesday the societies took a trip through the White Mountains and on Thursday they ascended Mount Washington, holding en route an informal symposium on the ecology on an alpine zone (report of Ecological Society of America). After spending Friday in further exploration of the Mount Washington region, the society transferred its activities to Maine for seven days, during which it visited a sporting camp and camping grounds in Maine woods, ascended Mt. Katahdin and continued to Eastport and examined the raised bogs and coast vegetation of Washington County. The Maine tour, under the leadership of F. H. Steinmetz and his colleagues of the University of Maine, closed on July 4 with a visit to Mt. Desert Island and Acadia National Park.

#### AMERICAN SOCIETY OF PLANT TAXONOMISTS

On Tuesday evening, June 24, the society held a joint session with the Botanical Society of America and participated in the field trips of the Torrey Botanical Club, which are reported above.

#### AMERICAN FERN SOCIETY AND SULLIVANT MOSS SOCIETY

The societies participated in the field trips of the Torrey Botanical Club.

#### NEW ENGLAND BOTANICAL CLUB

The society held field meetings on Thursday and Friday, June 26-27, under the leadership of A. R. Hodgdon. The region visited was the western part of Strafford County, N. H., and the adjacent parts of Merrimaack County.

#### ECOLOGICAL SOCIETY OF AMERICA

(From report by W. J. Hamilton, Jr., secretary)

The society participated in the field trips of the Torrey Botanical Club and organized a symposium on "Mount Washington (alpine) Ecology," consisting of a paper on "Weather and Climate" by Charles F. Brooks, a paper on "Glacial Geology" by Richard F. Goldthwait, two papers on alpine flora by Stuart R. Harris and A. J. Grant and three papers on alpine fauna by C. F. Jackson, Maurice Provost and C. P.



Alexander. The last paper on the program was "Mountaineering Photography," by H. Bradford Washburn. Attendance, 58.

#### NATIONAL ASSOCIATION OF BIOLOGY TEACHERS

(From report by Fletcher J. Proctor, program chairman)

On Wednesday, June 25, the society held two sessions at which seven papers were presented. In addition to papers on the content of courses in biology and methods of teaching, Charles J. Lyons, of Dartmouth College, presented a paper on "Some Old New England Diaries (Tree Rings)," and C. C. Little, of Jackson Memorial Laboratory, presented one on "Cancer." About 70 persons attended the sessions of the society.

#### SECTION ON PSYCHOLOGY (I)

(From report by E. G. Ekdahl, secretary pro tem.)

The section held two sessions on Thursday, June 26, at which seven papers were presented, with an attendance of about 45 persons. A paper on "German Military Psychology and Recent Trends in American Psychology," by H. L. Ansbacher, and another on "Dynamic Factor in Nationalism," by Ross Stagner, attracted exceptional attention. An important paper on an entirely different type of subject was "Stronger Relation between Adaptation and Intensity in After Images of the Control Area of the Retina," by Theodore Karkowski. The audience was fascinated by the reading of a paper by Michael J. Supa from a manuscript written in Braille. Other papers were presented by Clarence Young, Harold Schlosberg and Howard Kingsley. The opportunities for full presentation of papers and discussions of them afforded by a program not crowded by many papers were greatly appreciated.

#### SECTION ON SOCIAL AND ECONOMIC SCIENCES (K)

(From report by George A. Lundberg, secretary pro tem.)

Beginning on Tuesday morning, June 24, the section held two sessions on each of three successive days before which twenty-eight papers were presented. The general subject for the first two sessions was "The Second Colonization of New England." The papers in these two sessions, C. C. Zimmerman and A. M. Myhrman, *chairmen*, were devoted to such subjects as the Irish, the French Canadians and the Italians in New England, and the social, economic and ecologic problems connected with the arrival of these peoples. The speakers were Allen R. Foley, William R. Gordon, George C. Homans, Charles P. Loomis, A. M. Myhrman and John A. Rademacker, A. J. Newman, Irene B. Taeuber, Nathan L. Whetten, W. E. Whyte

and C. C. Zimmerman. The general subject of the third session was "Ecological and Demographic Aspects of the New England Area," which was discussed by Stanley D. Dodge, Samuel Koenig and Conrad Arensberg. George A. Lundberg was chairman.

The fourth session, Charles W. Coulter, *chairman*, was devoted to five papers on "Social Organization and Public Policy," the speakers being Philip M. Marston, Errol C. Perry, Thorsten V. Kalijarvi, Lashley G. Harvey and Edgar C. McVoy. The general subject of the fifth session was "Typical Problems of the New England Area; People and Resources," on which papers were presented by D. C. Babcock, Ruth J. Woodruff, Harry W. Smith, J. C. Blum and J. E. Bachelder. The final session, with George A. Lundberg *chairman*, considered "Social Welfare in New England" in papers by Charles Chakerian, Walter McKain and Lincoln Fairley. About 50 persons attended the sessions of the section. On Thursday evening the section held a joint dinner with the American Society of Agronomy at which H. H. Bennett, chief of U. S. Soil Conservation Service, delivered an address on "Soil Conservation in the Northeast."

#### THE NATIONAL SOCIAL SCIENCE HONOR SOCIETY, PI GAMMA MU

The society held a luncheon on Tuesday, June 24, at which brief addresses were delivered by S. Howard Patterson, president of the society, LeRoy Allen, secretary, and Governor Blood of New Hampshire. The society sponsored a general session of the association in the evening at which F. R. Moulton delivered an address on "Our Social Order." S. Howard Patterson presided and introduced the speaker. Attendance, about 225.

#### SECTION ON MEDICAL SCIENCES (N)

(From the report of Malcolm H. Soule, secretary)

The section held two sessions on Tuesday, June 24, at which twenty-one papers were presented, of which more than half were contributions by members of the faculty of the University of Vermont College of Medicine. Several papers were in important fields of experimental medicine, such as the tolerance of sugar by human subjects after different administrations of glucose, the effect of cystine on human milk production and the influence of glucose on the absorption and toxicity of sulfapyridine. Others involved experiments with lower animals. Two papers were on heart diseases. Several were concerned with infections and the germicidal efficacy of certain compounds. One was on neuro-muscular mechanisms in skeletal muscle contractions. The variety and importance of the subjects discussed were so great that the programs of the section attracted an audience of 97 persons.

## AMERICAN DIETETIC ASSOCIATION

(From report by Beula B. Marble, program chairman)

The society held two sessions on Thursday, June 26, at which six papers were presented. The audiences of 125 and 150, respectively, were drawn from every one of the New England states and included representation of at least twenty professional and related groups, such as dietetic and home economics associations and public health, nursing, pediatric and educational agencies. Miss Mary E. Foley presided at the first session, Miss Helen F. McLaughlin at the luncheon and Miss Dorothy Duckles at the second session.

## AMERICAN PSYCHIATRIC ASSOCIATION

(From report by Arthur H. Ruggles, chairman)

On Thursday, June 26, the society presented a symposium on "The Psychiatric Aspects of Civilian Morale" under the chairmanship of Arthur H. Ruggles. The five papers on the program discussed psychiatric aspects of civilian morale as related to children, the aged, industry, the community and the general public. The contributors were Douglas A. Thom, A. Warren Stearns, Lydia G. Giberson, George K. Pratt and Samuel W. Hamilton. The attendance was about 30.

## AMERICAN SOCIETY OF AGRONOMY, NORTHEASTERN SECTION

(From report by Ralph W. Donaldson, secretary-treasurer)

The society held a regional grassland conference beginning on Wednesday morning, June 25, and continuing until Friday afternoon, with an attendance of about 100. The program consisted of three sessions for the presentation of papers, four field trips and a joint dinner with the Section on Social and Economic Sciences, at which H. H. Bennett delivered an address on "Soil Conservation in the Northeast." At the first formal session, Dr. Fred Engelhardt, president of the University of New Hampshire, delivered an address of welcome, which was followed by three scientific papers. Six papers were presented at each of the two following sessions. The field trips were to the grass nursery on the O'Kane farm, the Angell farm, Chesley pasture, the farm of Frances Peaslee, Northwood Ridge, the Livingston farm and the R. N. Johnson farm, at each of which the results of experiments in grassland farming were exhibited. About 80 persons participated in these field trips.

## SOCIETY OF AMERICAN FORESTERS

(From report by Henry Clepper, secretary)

Beginning on Tuesday morning, June 24, the so-

ciety held six sessions at which twenty-seven papers were presented and which were attended by about 140 persons. The formal program consisted of four symposia: "Forest Insects and Diseases," presented in two sessions under the chairmanship of H. B. Peirson; "Forest Fire Control," presented in two sessions under the chairmanship of Austin Wilkins; "Forestry and National Defense," presented in one half-day session under the chairmanship of John H. Foster, and "Forestry and Rural Economy," presented in one half-day session under the chairmanship of Clifford Graham. The society held a business meeting and dinner at Hampton Beach, N. H., on June 25, under the chairmanship of C. S. Herr, at which Henry Schmitz was the speaker. On June 26 about 75 members and guests of the society took a field trip to the Manchester (N. H.) waterworks forest. One of the interesting events of the meeting was a demonstration by the U. S. Bureau of Entomology and Plant Quarantine of dusting for the control of the gypsy moth with the autogiro.

## HORTICULTURISTS OF NEW ENGLAND AND EASTERN CANADA

(From report by A. F. Yeager, secretary pro tem.)

On Thursday morning, June 26, the horticulturists met in three sections for a round-table discussion on "Body Stocks of Apple Trees," led by J. N. Waring; a round-table discussion on "Experimental Work in Floriculture," led by H. E. White, and a conference on "Home Vegetable Gardens in New England," led by J. R. Hepler. The society held one joint session with the American Society of Plant Physiologists, visited the University of New Hampshire greenhouses and field plots with the American Phytopathological Society and visited neighboring commercial orchards, vegetable areas, the carnation breeding house of Mr. Sims and other points of interest.

## SOCIETY OF SIGMA XI

(From report by George A. Baitsell, secretary)

The society held a luncheon on Thursday, June 26, which was attended by about 25 members. Brief addresses were delivered by Edward Ellery, president of the society, and George A. Baitsell.

## HONOR SOCIETY OF PHI KAPPA PHI

The society sponsored a general session of the association on Wednesday evening, June 26, at which Max Schoen delivered an address on "The Basis for Faith in Democracy." Lawrence R. Guild, secretary of the society, presided and introduced Dr. Schoen. The attendance was about 225.



## THE ASKOY EXPEDITION OF THE AMERICAN MUSEUM OF NATURAL HISTORY IN THE EASTERN TROPICAL PACIFIC

By Dr. ROBERT CUSHMAN MURPHY

AMERICAN MUSEUM OF NATURAL HISTORY

BETWEEN February 9 and May 26, 1941, an American Museum party operated the steel Diesel schooner *Askoy* in the area between the Gulfs of Panama and Guayaquil, and from the American coast to a meridian three hundred miles west of Point Chirambirá. The field of investigation thus included the shorelines of southern Darien, Pacific Colombia and Ecuador, such coastal or oceanic islands as the Perlas Archipelago, Gorgona, La Plata and Malpelo, and the outlying pelagic waters. From the points of view of geographer, oceanographer and marine biologist, the region offered a little-worked and fruitful field. A six-hundred-mile stretch of this part of Central and South America, for example, still ranks as the world's least known continental seacoast, while the adjacent bight of the equatorial Pacific has been only sporadically the scene of modern oceanic research.

During a cruise of approximately four thousand miles, investigations were conducted at well over a hundred precisely fixed stations. Some of these were distributed in series parallel with the shore and others at right angles, or across the course of the northward-flowing coastal current. Six of the latter transects were carried for distances of from fifty to three hundred miles offshore. On the southernmost of the sections, toward the west from Point Santa Elena, Ecuador, the most northerly line of stations worked by the British research ship *William Scoresby*, in 1931, was repeated. To this extent the campaign of *Askoy* was linked up with an earlier extensive survey in the ocean off Peru and Chile.

Routine procedure at the stations related chiefly to the surface layers, down to a depth of 150 meters. It included meteorological observations, surface temperatures, vertical temperature sections with the bathythermograph, sea-water samples from selected levels and quantitative catches made with Clarke plankton-samplers. The latter recently devised instruments automatically record the volume of water that passes through the nets, thus obviating the calculations formerly based upon net-diameter, speed and length of haul, etc. It is believed that on this expedition the Spilhaus bathythermograph received its first use in the Pacific Ocean. By working a thermometric element against a pressure element, this device traces on a smoked glass slide a graph which can be readily calibrated to indicate temperatures at all depths within its range. Since the plottings show

the thermoclines, they are immediately available as a guide to the most significant levels for taking salinity samples and plankton.

Less regular observations comprised phytoplankton hauls, direct surface current measurements at stations where the vessel could be anchored with hydrographic cable, temperature records obtained with reversing thermometers and soundings by means of wire or Kelvin tubes. (The fathometer with which *Askoy* was alleged to be equipped proved, unfortunately, to be in complete disrepair, a fact likewise true of much other gear guaranteed by the charter specifications). Dredging was carried out in many bays and estuaries, as well as on parts of the open continental shelf. Furthermore, the Dunn diving helmet was employed in the shore waters of numerous mainland and insular localities, particularly at sites of previously unreported reef-coral formations.

The planning and leadership of the expedition were entrusted to Dr. Robert Cushman Murphy, who in 1937 had made a preliminary reconnaissance in the same area. Dr. John C. Armstrong, of the museum's Department of Living Invertebrates, served as scientific associate, and José G. Correia as preparator. The crew comprised Captain Halford Connolly as sailing master, Robert François as mate and Oscar Paar as engineer. Between March 20 and the end of the field work, Lieutenant Eduardo Fallon, commander of the gunboat *Junin* and ranking Colombian naval officer on the Pacific coast of his country, was also a member of *Askoy's* contingent. Because of his intimate knowledge of a hazardous and poorly charted coast, his skill as a navigator, and his able share in every aspect of the investigations, Lieutenant Fallon's participation was a happy and invaluable asset. In early April the American Museum sent Mrs. Murphy by air as a courier to the expedition, with which she remained for a week along the coast of Ecuador.

The four months' use of *Askoy* was made possible by the interest and liberality of several individuals and organizations. Funds to cover the charter of the schooner and the purchase of certain costly equipment were given by Jesse Metcalf, who subsequently flew to Buenaventura and joined briefly in field work at the Bay of Málaga. Contributions, in part unsolicited, were made by the following additional

friends of the museum: Mrs. George Blumenthal, Mrs. Edward F. Dwight, Mr. and Mrs. Ward Melville, Messrs. Frederick F. Brewster, Guy Emerson, Edgar J. Marston, E. Hope Norton, Duncan H. Read and Henry D. Sharpe. Carll Tucker provided a motion picture camera and a supply of 16-mm Kodachrome film.

The Woods Hole Oceanographic Institution lent much apparatus, including two bathythermographs, which would have been otherwise unobtainable. The Hydrographic Office of the United States Navy and the Coast and Geodetic Survey furnished essential scientific and navigational equipment as well as credentials and other aid. The Governments of the Republics of Panama, Colombia and Ecuador, through the good offices of their respective embassies at Washington, and the executives of the Panama Canal Zone all offered their patronage and granted facilities and privileges in part unprecedented. Particularly generous and effective was the cooperation of the Colombian authorities, in whose national territory or zone of special interest the greater part of the period of the expedition was spent. In addition to the assignment of Lieutenant Fallon as a fellow-worker, the civil and military officials, together with numerous private citizens and foreign residents, extended hospitality and assistance at every opportunity.

Reports on the findings of the *Askoy* expedition will, of course, have to await dynamic interpretation of the statistical records and study of the collections. Most numerous among the latter are marine invertebrates of many classes, especially noteworthy being the organisms associated with coral growths. The apparent Indo-Pacific affinities of some of these will,

in the opinion of Dr. Armstrong, necessitate modification of certain currently accepted zoögeographic views.

The collection of fishes promises to be interesting, particularly because it includes a number of comensal species and a few luminescent deep-sea forms captured in plankton nets during night tows. Among other vertebrate collections are reptiles and amphibians from island and continental localities and about five hundred birds, mostly sea fowl. The distinctness of the warm-water area of convergent current movement in the tropical night from the cool zone of divergence to the south, i.e., the Humboldt Current littoral, is emphasized by the fact that the marine bird skins of the expedition include 19 species not taken during the American Museum's lengthy field work of earlier years along the coast of Peru. Incidentally, the area of *Askoy's* operations proved to be the seasonal non-breeding range of three northern-hemisphere birds of hitherto uncertain winter status, namely, the least petrel (*Halocyptena*), Sabine's gull (*Xema*) and black tern (*Chlidonias*). The stomachs of most of the sea birds were preserved, and it is hoped that their contents may be correlated with plankton and other collections so as to throw new light on the ecological chains that begin with such fundamental oceanic pasture as the diatoms.

Other data of the *Askoy* expedition are represented by field journals totaling 130,000 words, abundant photographs and colored motion picture film recording geographical and natural history subjects, oceanographic technique and the life of primitive Chocó Indians inhabiting the western watershed of the Baudó Mountains and the basin of the River San Juan.

## SCIENTIFIC EVENTS

### THE FAIRCHILD CONNECTICUT GARDEN

IN 1895 Benjamin Thomas Fairchild (1850-1939) purchased several hundred acres of land on Quaker Ridge, North Greenwich, Conn., for the purpose of carrying out a long cherished dream of establishing a wild flower sanctuary or preserve for the woody and herbaceous plants of Connecticut, and the region from Bar Harbor to the Adirondacks. He was thus a pioneer in conservation. The next forty years were spent in developing this tract by bringing in additional quantities of plants already there, and others not already on the tract. At the time of Mr. Fairchild's death, more than 400 species native to Connecticut and the more northern region had become established and listed.

In addition to the flowers the garden has an abundance of native animal life, including deer, ducks, rabbits, woodcock, pheasants, quail and grouse; it also

has many varieties of native and migrant song birds, thus serving as a bird sanctuary. A bird census of the garden, made on May 18 by Dr. Frederick H. Pough and Roger Peterson, of the National Audubon Society, resulted in the listing of eighty-two species of birds.

Mr. Fairchild was not only a nature lover, but a man of scientific training, at the head of his own chemical manufacturing firm. A trustee of New York University, he was interested in education, and it was his plan to have the Connecticut Garden serve an educational end in addition to being a plant "sanctuary." On Mr. Fairchild's death the property had a value of approximately \$127,000. In order that his wishes for the development and active use of the garden might be carried out his heirs formulated a plan to turn it over to a board of trustees for \$60,000, or less than half its appraised value.



On February 9, 1941, the Fairchild Connecticut Garden, Incorporated, a non-profit educational corporation, was formed, which has acquired title to 127.49 acres of the garden, the portion of greatest floristic and ecological value. It is planned to make it a center of educational work for nature study and related subjects.

The trustees of the Fairchild Connecticut Garden, Inc., are as follows: B. Tappen Fairchild, president of Fairchild Brothers and Foster, manufacturing chemists, who inherited the estate from his uncle; Mrs. B. Tappen Fairchild (Mr. and Mrs. Fairchild have maintained the sanctuary since the death of Benjamin Fairchild); also Thomas J. Watson, president, International Business Machines Corporation; Dr. Harry Woodburn Chase, chancellor of New York University; Dr. Robert Cushman Murphy, curator of oceanic birds, American Museum of Natural History, and honorary president of the National Audubon Society; Dr. Elmer Drew Merrill, professor of botany and supervisor of the Arnold Arboretum, Harvard University; Dr. Frederick H. Pough, assistant curator of mineralogy, American Museum of Natural History. Dr. C. Stuart Gager, director, Brooklyn Botanic Garden, is serving as president *pro tempore*; and Percy H. Jennings, president of the Vita-Glass Corporation, is treasurer.

#### THE AMERICAN CHEMICAL SOCIETY AND ORGANIZED LABOR

EFFORTS to enrol chemists in the ranks of organized labor are opposed by the American Chemical Society, according to an announcement made by Dr. Charles L. Parsons, secretary of the society.

The society has been informed of "a very serious situation" at Emeryville, Calif., where an attempt is being made to force professional men, including all research workers below the rank of department heads, to join a closed shop union within the Federation of Architects, Engineers, Chemists and Technicians, a C.I.O. affiliate. The plant affected is that of the Shell Development Company.

The directors of the society, Dr. Parsons points out, have definitely gone on record against the association of professional chemists and chemical engineers with a union, "thereby being rated as laborers and losing their status as professional men." He questions whether a pure research corporation can hope to survive under non-professional control.

Dr. Parsons wrote to members of the society in Emeryville in part as follows:

Nothing could be more fatal to the chemist, the engineer, the doctor or the lawyer than the loss of professional status. The society, of necessity, would be obliged to inform the chemical departments of every college and uni-

versity, as well as the chemists of America, as to the conditions to which their graduates would be subject should they accept employment with any corporation that would consent to any such fate for its professional men.

In the event that the Shell Development Company consents to a closed shop, with the Federation of Architects, Engineers, Chemists and Technicians as sole bargaining agent, and includes its professional men—which I can not conceive to be possible—every chemist who is a member of the union will very distinctly jeopardize his future.

Dr. Parsons reports that the American Chemical Society now has approximately 28,000 members, the largest number in its history. He states that the society will resist any attempt to coerce its members into any form of closed shop unionization. He concludes: "This is a professional organization, and the membership must make every effort to see that it so remains."

#### THE AMERICAN SOCIETY OF MAMMALOLOGISTS

THE twenty-third annual meeting of the American Society of Mammalogists was held in Chicago from June 9 to 13.

Officers of the society elected for the ensuing year are as follows: *President*, Walter P. Taylor, Texas A. and M. College, College Station; *Vice-presidents*, E. Raymond Hall, University of California at Berkeley, and A. Brazier Howell, the Johns Hopkins Medical School; *Recording Secretary*, Robert T. Orr, California Academy of Sciences; *Corresponding Secretary*, Emmet T. Hooper, Museum of Zoology, University of Michigan; *Treasurer*, Viola S. Schantz, U. S. Fish and Wildlife Service, Washington, D. C.; *Editor*, William B. Davis, Texas A. and M. College, College Station. *Directors*, elected for the period 1941-1943, are: Victor H. Cahalane, National Park Service, Washington, D. C.; William J. Hamilton, Cornell University; John Eric Hill, American Museum of Natural History; Remington Kellogg, U. S. National Museum, and Otis Wade, University of Nebraska. *Additional directors* are: William H. Burt, University of Michigan; Joseph S. Dixon, National Park Service, California; Colin C. Sanborn, Field Museum of Natural History, Chicago; W. E. Saunders, London, Ontario, and George Willett, Los Angeles Museum, California.

The following resolution unanimously adopted by the society is of general interest:

WHEREAS, There is now before the House of Representatives of the United States a bill known as the Murock Bill (H. R. 2675) and a companion bill before the Senate (S. 260) to open the Organ Pipe Cactus National Monument, Arizona, to prospecting and mining;

WHEREAS, The Organ Pipe Cactus National Monument was established to preserve for public use, education and

enjoyment the outstanding example of Sonoran desert in the United States;

WHEREAS, The area has been prospected for generations, without producing important mines and no mines are being operated therein to-day;

WHEREAS, The enactment of legislation opening this national monument to prospecting and mining under these circumstances would be a negative approach to the problems of an important and unique public reservation, which, by virtue of its situation on the international boundary between Mexico and the United States, has scientific and cultural possibilities of international importance;

Therefore, be it Resolved, That the American Society of Mammalogists, comprising a membership of about 1,000 scientists and educators, at its annual conference, June 12, 1941, petitions the Congress of the United States not to enact the Murdock and Hayden bills, which would result in impairment of this great public reservation, but petitions the Congress to appropriate sufficient funds to provide the protection and facilities required to put the Organ Pipe Cactus National Monument to its highest public use.

#### OFFICERS OF THE SOCIETY FOR RESEARCH ON METEORITES

THE council of the Society for Research on Meteorites, an affiliated organization of the American Association for the Advancement of Science, as elected for the 1941-45 term at the eighth meeting of the society held in Flagstaff, Ariz., on June 23, 24 and 25, is as follows:

*President:* Dr. Lincoln La Paz, Ohio State University.

*Vice-presidents:* Dr. F. R. Moulton, Smithsonian Institution Building, Washington, D. C.; Dr. Charles P. Olivier, Flower Observatory, University of Pennsylvania; Dr. L. J. Spencer, London.

*Secretary:* Dr. C. H. Clemminshaw, Griffith Observatory and the University of Southern California, Los Angeles.

*Treasurer:* Major L. F. Brady, Mesa Ranch School, Mesa, and the Museum of Northern Arizona, Flagstaff.

*Editor:* Dr. Frederick C. Leonard, University of California at Los Angeles.

*Councilors:* Professor Earle G. Linsley, Chabot Observatory and Mills College, Oakland, Calif.; Dr. Howard A. Meyerhoff, Smith College; Oscar E. Monnig, Texas Observers, Fort Worth, Texas; Dr. F. A. Paneth, University of Durham, England; Stuart H. Perry, *Adrian Telegram*, Michigan; Professor J. Hugh Pruett, University of Oregon; Dr. Fred L. Whipple, Harvard College Observatory.

The president during the 1937-41 term, Dr. H. H. Nininger, Colorado Museum of Natural History and the American Meteorite Laboratory, Denver, is *ex officio* a councilor during the 1941-45 term.

#### THE BIRTHDAY HONORS CONFERRED BY THE KING OF ENGLAND

Nature prints the names of scientific men and others

associated with scientific work that appear in the King's Birthday Honors List. These include:

*Baron:* F. A. Lindemann, personal assistant to the Prime Minister, professor of experimental philosophy, Oxford.

*G.B.E.:* Viscount Nuffield.

*K.C.B.:* Sir George Gater, permanent Under-Secretary of State for the Colonies and secretary, Ministry of Home Security, formerly clerk and education officer to the London County Council.

*K.C.M.G.:* Frank Gill, for services in development of the telephone industry and of international telephony; Dr. H. H. Scott, director of the Bureau of Hygiene and Tropical Diseases, London.

*Knights Bachelor:* Colonel A. S. Angwin, engineer-in-chief, General Post Office; R. W. Gillespie, a founder of the Fairbridge Farm Schools in Australia; Professor J. P. V. Madsen, professor of electrical engineering, University of Sydney, and chairman of the Radio Research Board, Australia; Dr. P. H. Manson-Bahr, for services to tropical medicine and as consulting physician to the Colonial Office; K. G. Mitchell, consulting engineer (roads), India; E. B. Pratt, managing director, Imperial Chemical Industries (India), Ltd.; Professor J. B. S. Stopford, vice-chancellor, University of Manchester.

*C.B.:* C. A. Taylor, regional director, London Telecommunications, General Post Office; F. A. Whitaker, civil engineer in chief, Admiralty.

*C.M.G.:* The Honorable F. E. Harris, Minister of Agriculture and Lands, Minister of Supply, Industry and Post-war Development, Southern Rhodesia; Dr. S. A. Neave, assistant director, Imperial Institute of Entomology; Dr. H. A. Tempany, agricultural adviser to the Secretary of State for the Colonies.

*C.I.E.:* W. Meiklejohn, senior conservator of forests, Bengal; C. F. C. Beeson, forest entomologist and conservator, Government of India.

*C.B.E.:* Professor F. C. Bartlett, professor of experimental psychology at the University of Cambridge and a member of the Flying Personnel Research Committee; Major G. P. Bulman, director of engine development and production, Ministry of Aircraft Production; W. Deacon, president of the Pharmaceutical Society of Great Britain; W. A. Elder, principal veterinary and agricultural officer, Swaziland; R. H. Franklin, assistant secretary, Ministry of Agriculture and Fisheries; Dr. J. A. Glover, lately senior medical officer, Board of Education; P. Good, deputy director, British Standards Institution; M. T. Tudsbury, civil engineer to the British Broadcasting Corporation; Dr. R. Wilson, Commonwealth statistician and economic adviser to the Treasury, Australia.



## RECENT DEATHS

DR. EDWARD KREMERS, until his retirement with the title of emeritus in 1935 professor of pharmaceutical chemistry at the School of Pharmacy of the University of Wisconsin, died on July 9. He was seventy-six years old. Dr. Kremers was director of the courses in pharmacy at the university from 1899 to 1935 and was pharmaceutical chemist at the Experiment Station from 1912 to 1935.

DR. EDGAR ALBERT BURNETT, chancellor emeritus of the University of Nebraska, died on June 28. He was seventy-five years old. Dr. Burnett was dean of the College of Agriculture and director of the Experiment Station until 1928 when he became chancellor of the university.

DR. CARL EDWARD MAGNUSSON, professor of electrical engineering and dean emeritus of the College of Engineering of the University of Washington, died on July 10 at the age of sixty-nine years.

HOWARD HACKEDORN, since 1918 professor and head of the department of animal husbandry at the

State College of Washington, died on June 30. He was fifty-six years old.

JOSEPHINE CURTIS FOSTER, professor in the Institute of Child Welfare at the University of Minnesota since 1926, died on July 3 at the age of fifty-two years.

DR. ROBERT ROBISON, head of the department of biochemistry of the Lister Institute and professor of biochemistry at the University of London, died on June 18 at the age of fifty-seven years.

DR. VICTOR JOLLOS, formerly of the Kaiser Wilhelm Institut für Biologie, Berlin-Dahlem, known for his work on heredity and genetics, died on July 5 at the age of fifty-three years. Dr. Jollos was visiting professor of zoology and genetics at the University of Wisconsin from 1934 to 1937. Before going to Madison he served on the faculties of the Universities of Berlin, Munich and Cairo.

THE death on March 17 is announced of Professor W. Vogt, professor of anatomy in the University of Munich, known for his work on embryology of the Amphibia.

## SCIENTIFIC NOTES AND NEWS

PROFESSOR ROSWELL P. ANGIER retired on June 30 as chairman of the department of psychology and associate dean of the Graduate School, Yale University. A portrait of Professor Angier was presented to the university on June 10 by a group of present and past colleagues and students. The portrait was painted by Professor Deane Keller, of the Yale School of Fine Arts, and has been hung in the reception hallway of the department of psychology.

M. L. WILSON, director of extension service in the U. S. Department of Agriculture, has been appointed director of nutrition by Paul V. McNutt, Federal Security Administrator. Mr. Wilson will aid Mr. McNutt in his work as coordinator of health, welfare and related defense activities and will be in charge of nutrition activities.

THE College of Physicians of Philadelphia has awarded the Alvarenga Prize to Dr. John J. Bittner, of the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine, "in recognition of his distinguished studies on cancer." This prize was established by the will of Pedro Francisco DaCosta Alvarenga, of Lisbon, Portugal, an associate fellow of the College of Physicians, to be awarded annually by the college on each anniversary of the death of the testator, July 14, 1883, "to the author of the best memorial upon any branch of medicine, which may be deemed worthy of the prize."

THE University of Königsberg has awarded to Professor Otto Hahn, director of the Kaiser Wilhelm Institute for Chemistry, Berlin-Dahlem, the Copernicus Prize for 1941 for his work on radioactivity.

DR. ALLAN PALMER, instructor in obstetrics and gynecology at the School of Medicine of the University of California, has been elected a foreign associate of the Physiological Society of Great Britain.

*Nature* reports that Dr. Max Nonne, professor of neurology at the University of Hamburg, on the occasion of his eightieth birthday was awarded the Goethe Medal for Art and Science.

TOWNES R. LEIGH, dean of the College of Arts and Sciences, University of Florida, received the honorary degree of doctor of science at the recent commencement exercises of the John B. Stetson University. The degree was awarded in recognition of his "long and distinguished service as professor of chemistry."

THE University of Arkansas conferred recently the honorary degree of doctor of science on Dean E. J. Kyle, of the School of Agriculture of the Agricultural and Mechanical College of Texas at College Station.

NOMINATIONS for officers of the American Society of Mechanical Engineers for 1942 include for *President*, James W. Parker, vice-president in charge of engineering, Detroit Edison Company; for *Vice-pres-*

idents, Clarke F. Freeman, vice-president in charge of fire prevention engineering and underwriting, Manufacturers Mutual Fire Insurance Company, Providence; Clair B. Peck, managing editor, *Railway Mechanical Engineering*; William H. Winterrowd, vice-president of the Baldwin Locomotive Works, and Willis R. Woolrich, dean of engineering and director of the Bureau of Engineering Research, University of Texas. Election will be held by letter ballot of the entire membership of 15,000, closing on September 23.

MISS MARY LOUISE MARSHALL, librarian of the Tulane University School of Medicine Library, New Orleans, was elected president of the Medical Library Association at its annual meeting in Ann Arbor, Mich., which was held on May 29, 30 and 31. Dr. John F. Fulton, of Yale University, was elected vice-president, and Miss Anna C. Holt, of the Harvard University Schools of Medicine and Public Health Library, was reelected secretary. The convention in 1942 will be held at the Tulane University School of Medicine.

At the annual general meeting of the Institute of Physics, London, held on June 4, the following were elected to take office on October 1: *President*, Sir Lawrence Eragg; *Vice-president*, Professor W. Makower; *Honorary Treasurer*, Major C. E. S. Phillips; *Honorary Secretary*, Professor J. A. Crowther; *Ordinary Members of the Board*, Professor J. Chadwick and D. C. Gall.

*Nature* writes: "A unique ceremony took place in the Cabinet Room at 10 Downing Street on June 12, when the President of the Royal Society, Sir Henry Dale, admitted the Prime Minister into the fellowship of the Society. Among those present were the society's biological secretary, Professor A. V. Hill, M.P., the physical secretary, Professor A. C. G. Egerton, the foreign secretary, Sir Henry Tizard, and the assistant secretary, Mr. John D. Griffith Davies. After the Prime Minister had signed his name in the ancient Charter Book, Sir Henry Dale showed him the signature of his ancestor, Sir Winston Churchill, father of the great Duke of Marlborough, who was one of the early fellows of the Society, having been admitted into the fellowship in 1664."

THE *Journal* of the American Medical Association reports that Dr. Charles H. Best, professor and head of the department of physiology of the Faculty of Medicine of the University of Toronto, has been appointed director of the Banting-Best Department of Medical Research to succeed the late Sir Frederick Banting. Dr. Best will resign as associate director of the Connaught Laboratories, where he has been in charge of the purification and production of insulin.

JOHN A. KING, professor of mechanical engineering at the University of Kansas, has been appointed professor of mechanical engineering and head of the department in the College of Applied Science at Syracuse University. He succeeds the late Professor Albert R. Acheson.

DR. DONALD G. MARQUIS has been appointed chairman of the department of psychology of Yale University. Dr. Carl I. Hovland has been made director of graduate studies. Dr. Robert L. French has been appointed Sterling fellow in psychology, and Dr. Judson S. Brown, Harvard University, and Dr. Medford B. Wesley, University of Minnesota, have been appointed instructors.

PROFESSOR G. WATTS CUNNINGHAM, chairman of the department of philosophy of Cornell University, and Professor R. Clifton Gibbs, chairman of the department of physics, have been elected faculty representatives on the Board of Trustees of the university for terms of five and six years, respectively.

DR. R. A. Q. O'MEARA has been elected a fellow of Trinity College, Dublin, where he is at present acting professor of bacteriology.

PROFESSOR H. M. FOX, since 1927 professor of zoology in the University of Birmingham, has been appointed, from October 1, to the chair of zoology in the University of London, tenable at Bedford College.

PROFESSOR R. B. THOMSON has retired as head of the department of botany at the University of Toronto and has been appointed professor emeritus as from July 1. Dr. H. S. Jackson, who has been professor of mycology since 1928, has been appointed to succeed him as head of the department.

DAVIS E. RUSHING, of the Southern Experiment Station of the U. S. Bureau of Mines, has become assistant chemist in the Industrial Hygiene Division at Bethesda, Md., of the National Institute of Health.

DR. HAROLD E. JONES, director of the Institute of Child Welfare of the University of California at Berkeley, has been appointed a member of the National Research Council in the division of anthropology and psychology.

DR. RICHARD W. LINTON, formerly of the department of pathology, Cornell University Medical College, New York City, has joined the staff of the Biochemical Research Foundation, Newark, Del. He will work on problems of bacterial structure and chemotherapy.

DR. C. E. REHBERG, instructor in the department of chemistry at the University of Texas, has become research chemist with Sharples Chemicals, Inc., Wyandotte, Mich.



THE British Air Ministry has appointed Dr. T. F. Macrae and Squadron-Leader W. P. Stamm, of the medical branch of the Air Force, as biochemist and specialist medical officer, respectively, to watch over the food supplied to the R.A.F. Dr. Macrae, who will also hold the temporary rank of squadron-leader, is biochemist to the division of nutrition of the Lister Institute.

DR. VAN DEN BOS, chief assistant at the Union Observatory, Johannesburg, has been appointed to succeed Dr. H. E. Wood, who retired as director of the observatory last February.

THE following will be members of a British Committee, announced by Ernest Brown, Minister of Health in the House of Commons, which has been set up to investigate what further steps can usefully be taken to secure the utmost economy in the employment of medical personnel in the forces, the emergency hospital scheme, the Civil Defense Services and all other medical services: Geoffrey Shakespeare, Under-Secretary for the Dominions, *chairman*; Professor R. M. F. Picken, Welsh National School of Medicine; Sir Alfred Webb-Johnson, vice-president of the Royal College of Surgeons; Dr. J. Crichton Bramwell; Professor Sydney Smith, University of Edinburgh; Dr. J. A. Brown; Dr. William Malcolm Knox, and medical representatives of the Admiralty, War Office and Air Ministry. In addition, the following have agreed to be closely associated with the work of the committee: Sir Charles Wilson, president of the Royal College of Physicians; Sir Hugh Lett, president of the Royal College of Surgeons, and Dr. H. S. Souttar, chairman of the Central Medical War Committee.

CHAUNCEY J. HAMLIN, president of the Buffalo Society of Natural Sciences; Dr. Carlos E. Cummings, director of the museum, and H. Phelps Clawson, curator of anthropology, will sail from New York to Rio de Janeiro on August 1 to assist in reorganizing the exhibit and educational programs of Brazilian museums. A \$12,500 grant from the Rockefeller Foundation has been made to finance the journey in response to the request for aid in plans for reorganization of Senorita Heloisa Alberto Torres, director of the National Museum of Rio de Janeiro.

THE Civil Service Commission has announced an examination for industrial specialists at pay from \$2,600 to \$5,600 a year. Applications will not be accepted after August 7. Industrial specialists may be called upon to perform any of three types of service: liaison representative to develop and maintain working relationships with manufacturers of materials or equipment; consultants on industrial materials, methods and processes, evaluation of the

data of industrial concerns, and investigator and analyst in the field of industrial materials. To qualify for these positions, experience is required that has given the applicant a thorough knowledge of production methods and processes in one or more manufacturing industries. Applicants are rated on their education and experience. An oral examination may be given. There will be no written test and application forms may be obtained at any first- or second-class post office or from the Civil Service Commission in Washington. The Army Air Corps needs instructors for the Air Corps Technical Schools at Chanute Field, Rantoul, Ill.; Scott Field, Belleville, Ill.; Biloxi, Miss., and Wichita Falls, Texas. An insufficient number of qualified persons were obtained through previous examinations held for these positions. Applications should be filed at once. No written examination is required. There are three grades of positions—assistant instructor, at \$2,600; junior instructor, at \$2,000, and student instructor, at \$1,620. Opportunities for advancement are excellent. Within thirty days after appointment promotions to higher grade are possible with salaries up to a maximum of \$3,000 a year.

THE College of Engineering of the University of Wisconsin is making preparations for the meeting of the North Midwest Section of the Society for the Promotion of Engineering Education to be held at Madison on October 10 and 11. Three to four hundred guests from the colleges of engineering and the technical divisions of other schools in the states of Iowa, Michigan, Minnesota and Wisconsin are expected to attend.

AT a meeting at the New York Zoological Park, on July 12, at which directors of the larger zoological parks in the United States discussed problems of animal supply created by the war, it was decided to form a National Association of Zoological Parks Directors. European sources for the purchase of animals are no longer accessible, but a collector will be available in Colombia, Ecuador and Venezuela, where it is hoped to obtain specimens. A quarantine station may be established at Mombasa, South Africa, to facilitate shipments from Africa. Directors attending the meeting, which was followed by a dinner at the Hotel Commodore, included Dr. William Mann, of the National Zoological Park, Washington; Edward Bean, of the Brookfield Zoological Park, Chicago; Roger Conant, of the Philadelphia Zoological Garden; George P. Vierheller, of the St. Louis Zoological Park; John T. Millen, of the Detroit Zoological Garden; R. Marlin Perkins, of the Buffalo Zoological Garden, and Ward Walker, of the Garden at Hershey, Pa.

## DISCUSSION

THE BREATHING MECHANISM OF  
TURTLES

THE commonly accepted statement that turtles breathe air in a manner essentially similar to frogs is in serious error. Most of the text-books that mention the breathing mechanism of the turtle have perpetuated the respected opinion of Louis Agassiz<sup>1</sup> and many others that the air is pumped into the lungs by throat action. Casual observation of any turtle will show that the hyoid apparatus does indeed produce movements like those in the Amphibians. It is not surprising, therefore, that such actions should be deemed the essential mechanism of breathing.

During the course of operative experiments upon the box turtle in which the body cavity was opened it became obvious that throat action was ineffective and probably had nothing to do with the case. Further experiments to test the efficacy of the hyoid apparatus and to ascertain what did cause the movements of inhalation and exhalation indicated that the whole action was performed by distinct respiratory muscles in the body and not by the throat. That turtles with broken imperfect jaws continue to breathe and live with an impossible and leaking mouth pump, that there are no valves in the nostrils of turtles, and that experimentally the mouth may be tied open indefinitely without affecting the animal's breathing should explode the notion of a mouth pump. Further, tracheotomy shows no air movements in the trachea during the expansion and contraction of the throat. The throat actions do result in aeration of the mouth, and in aquatic turtles where water is taken in and out of the mouth, it affords respiration through the lining of the mouth and pharynx. This has been shown by S. H. and S. P. Gage<sup>2</sup> in 1885.

In his excellent book "Turtles of the United States and Canada," Mr. Pope<sup>3</sup> puts no faith in throat action, but points out that it appears to be a rotation of the girdles which is responsible for the chief respiratory movements. This is an interesting view but somewhat obscure. It is doubtful whether the pelvic girdle should be considered in this regard, but it is true that the pectoral girdle does rotate during the respiratory movements.

The essence of the whole mechanism has been adequately described in a paper by S. Weir Mitchell and George R. Morehouse<sup>4</sup> published in 1863, and appar-

ently forgotten by the subsequent generations of comparative anatomists. Briefly, inspiration is accomplished by two flank muscles which, acting like the mammalian diaphragm, enlarge the coelom and thus suck air into the lungs. The shoulder girdle passively rotates forward during inhalation. To accomplish expiration, the turtle uses an expiratory muscle consisting of two anterior and two posterior bellies connected by a tendinous band continuous across the mid-ventral line, and common to both sides of the animal. Air is forced out by the concerted action of the four parts of this muscle which compress the viscera against the lungs. This action may be aided by pulling in the legs and neck which thus further tend to decrease the body cavity. It has been clearly shown that girdle, leg or neck movements need not take place. The muscles mentioned are entirely adequate to the task. It follows then that an open body cavity will stop breathing. It is easy to demonstrate with the use of a manometer attached to the coelom that the pressure momentarily dips during inspiration and rises during expiration.

Dr. Simon H. Gage,<sup>5</sup> writing in 1883, says: "During the last twenty-five years the mechanism of respiration in the Chelonia has been investigated with considerable thoroughness both in this country and Europe; and at present the Chelonian form of respiration is considered to be comparable with that of the mammal rather than that of the frog, as formerly supposed." In spite of misleading text-books, the suspicion is strong that the turtles have not changed since.

IRA B. HANSEN

THE GEORGE WASHINGTON UNIVERSITY

NICOTIANA RUSTICA CULTIVATED BY  
PUEBLO INDIANS

IN 1934, while engaged in an ethnologic study of the Indian Pueblo of Tamaya (commonly called by its Spanish name, Santa Ana, located on the Jemez river about 25 miles north of Albuquerque), I was told by an Indian informant that tobacco was cultivated by a certain individual at the pueblo's farms at Ranchitos (on the east bank of the Rio Grande, just north of Bernalillo, N. M.). Subsequently, I learned that this individual was a member of a society of medicine men and that the tobacco was grown for ceremonial use. I obtained a specimen of this tobacco. It has been identified as *Nicotiana rustica* by Mr. Volney H. Jones, ethnobotanist in the Museum of Anthropology, University of Michigan, to whom I am indebted for much assistance in the preparation of this paper. The specimen has been deposited in the Museum of Anthropology, University of Michigan (Cat. No. 14698). In

<sup>5</sup> S. H. Gage, *Proceedings American Association Advancement of Science*, Vol. 32, pp. 316-318, 1883.

<sup>1</sup> Louis Agassiz, "Contributions to the Natural History of the United States," Vol. 1, p. 281, 1857.

<sup>2</sup> S. H. Gage and S. P. Gage, *Proceedings American Association Advancement Science*, Vol. 34, pp. 316-318, 1885.

<sup>3</sup> C. H. Pope, "The Turtles of the United States and Canada," 1939.

<sup>4</sup> S. Weir Mitchell and George R. Morehouse, *Smithsonian Contributions to Knowledge*, Vol. 13, No. 159, 1863.



1936, Mr. Jones himself saw tobacco under cultivation at the Indians' farms at Ranchitos and was told by an Indian that this was the kind of tobacco commonly grown and used by them. Mr. Jones judged this tobacco to be *N. rustica*, although he did not have the opportunity to make definitive identification at that time.

This discovery is of interest for two reasons: (1) There is very little evidence indeed to indicate that tobacco of any kind has ever been cultivated by the Pueblo Indians of the Southwest; and (2) it is surprising to find this particular species of *Nicotiana* in this region.

Ad. F. Bandelier, who made first-hand studies of the Pueblo Indians in the 1880's and who was intimately acquainted with the documentary history of the pueblos, has declared that "tobacco was not known to the Pueblos until Spanish rule became established."<sup>1</sup> John H. Bowman, an Indian agent of the "Navajo Agency, New Mexico," in a report to the Commissioner of Indian Affairs dated September 9, 1884, states that the Hopi cultivated tobacco "to an insignificant extent" (p. 137). George Vasey states that *N. rustica* "was cultivated by the Indians in New Mexico and Arizona, as observed by Dr. Ed. Palmer."<sup>2</sup> Considerable search has failed to discover this statement in the publications of Dr. Palmer. But, in one of Palmer's papers, we find evidence to the contrary: he states that *N. attenuata*, *N. trigonophylla* and *N. bigelovia* were used by the Indians of the Southwest, but implies that they were not cultivated.<sup>3</sup> Robbins *et al.* state that the Tewa Indians of north central New Mexico "formerly cultivated" *N. attenuata*, but cite no evidence whatsoever in support of this claim.<sup>4</sup> A. F. Whiting lists *N. attenuata* and *N. trigonophylla* as the tobaccos used by the Hopi Indians and remarks that "it is said that tobacco is cultivated sporadically."<sup>5</sup> Mr. V. H. Jones observed a few plants of *N. attenuata* growing here and there, at random, among other plants in gardens near the Hopi pueblo of Walpi. He was told by a trustworthy Hopi that these tobacco plants had not been planted, that they had come up of their own accord, but the gardeners had allowed them to remain and that they would be harvested eventually. This might be called "semi-cultivation." Thus, the specimens collected by myself at Ranchitos and the observations of Mr. Jones at the same place, constitute the

only conclusive evidence of intentional and systematic cultivation of tobacco among the Pueblo Indians of which the present writer is aware.<sup>6</sup>

Our discovery of *N. rustica* at Ranchitos is the only conclusive evidence of the existence of this species in the Southwest that we have. We know of only one other claim that this species has been found in this region, *viz.*, the statement previously quoted from Vasey. But, as we have seen, this statement is opposed, rather than supported, by the authority whom Vasey cites. Wm. A. Setchell, in "Aboriginal Tobaccos,"<sup>7</sup> states that *N. rustica* was cultivated in the Eastern Woodland and the Southeastern culture areas. The western boundary of *N. rustica*, according to Setchell, "is probably along the line of the eastern boundary of the 'Plains area' as outlined by Wissler [in 'The American Indian']," *i.e.*, but a short distance west of the Mississippi River (p. 402). The Southwestern area, says Setchell, "used an entirely different species, *viz.*, *Nicotiana attenuata* Torrey," (p. 410). He also places *N. trigonophylla* in the Southwest, "ranging from southeastern California to the western borders of Texas" (pp. 412-13).

*N. rustica* is believed to have originated in Mexico and to have entered the Southeast "through the southwestern corner of Texas," (Setchell, p. 410). The presence of this species under cultivation at Tamaya to-day remains to be explained. It may have been introduced within the past 50 years or so from some eastern Indian reservation, to be sure. But the possibility that it may be a relic of the original diffusion from Mexico can not be entirely dismissed at this time.

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### CERVICAL EXPOSURE AND ABRASION IN HUMAN TEETH FOR DIFFERENT AGE CLASSES<sup>1</sup>

THERE are numerous references in dental literature to the existence and cause of abraded areas along the gingival margin of human teeth, but the degree of incidence of this condition has not been determined. From clinical data recently collected, it appears that this incidence is unexpectedly high. For these reasons a preliminary report is presented at this time.

Two hundred individuals, divided equally as to sex, and into four age groups, 20-29, 30-39, 40-49 and 50-59, were examined. The examination consisted of measuring the linear extent of exposed cementum or dentin, on the buccal, or labial, surface of each tooth

<sup>6</sup> Professor E. F. Castetter, of the University of New Mexico, who has been making studies of plants used by the Pueblo Indians, may have data on this point.

<sup>7</sup> *American Anthropologist*, 23: 397-414, 1921.

<sup>1</sup> A project of the Research Foundation, the Ohio State University, carried on with the aid of a grant from the Procter and Gamble Company.

<sup>1</sup> *Final Report*, etc., Pt. I, p. 37 (Papers of the Archaeological Institute of America; Amer. Series III; 1890).

<sup>2</sup> Report of the botanist, p. 76 (in Report of the Commissioner of Agriculture for 1886).

<sup>3</sup> "Plants used by the Indians of the United States," p. 650, *American Naturalist*, Vol. 12, 1878.

<sup>4</sup> W. W. Robbins, J. P. Harrington and B. Freire-Marreco, "Ethnobotany of the Tewa Indians," p. 103, Bull. 55, Bureau of American Ethnology, 1916.

<sup>5</sup> "Ethnobotany of the Hopi," p. 90, Bull. 15, Museum of Northern Arizona, 1939.

in the mouth. The degree of abrasion, if any existed, was measured by determining the depth of any cuts or grooves found. A study was also made of the relationship between the condition of oral hygiene and the presence, or absence, of abrasion.

The results show that only a small percentage of teeth with 0.5 mm of exposure were abraded, whereas a very high percentage of those with 1.0 mm, or more, exposure showed some loss of the dentin. Therefore, it appears that 1.0 mm of exposure is critical in the sense that it permits considerable wear if the subject practices average oral hygiene. In the age groups 20-29, 30-39, 40-49, 50-59, critical exposures existed on one or more teeth in 58 per cent., 84 per cent., 96 per cent. and 94 per cent. of the subjects, respectively.

The incidence of some extent of abraded cementum and dentin increased with age from 42 per cent. to 76 per cent. The percentage of subjects showing wear greater than 0.5 mm deep increased from 4 per cent. in the age group 20-29 to 42 per cent. in the groups above 40 years of age.

An excellent correlation was found between the thoroughness of oral hygiene and the occurrence of abrasion. In those portions of the mouth where tooth-brushing was most thorough, and among those people with the best oral hygiene, the incidence of abrasion was the highest and on the other hand, where poor oral hygiene was observed very little abrasion was noted.

The influence of age and oral hygiene on exposure and abrasion of cementum and dentin has been briefly summarized here. It is planned to present this data in detail at a later date along with a discussion of the effect of sex and the position of the tooth in the mouth on exposure and abrasion.

PAUL C. KITCHIN

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### THE EFFECT OF CHLOROFORM ON SOME INSECT BITES

DUE, in part at least, to economic factors the control of mosquitoes and biting insects is not always feasible or practical. Nevertheless, this state of affairs affords little consolation to the susceptible individual who must live and work where these pests abound.

In 1924 the writer noticed that cotton saturated with carbon tetrachloride rubbed briskly on mosquito bites caused a rapid cessation of pruritis. Later chloroform was substituted, and found superior. Since then similar trials have been made on a number of individuals, including several physicians. It was felt that the testimony of the latter would add some degree of validity to these rough tests.

The arthropods concerned in these tests were the local red bug, *Trombicula* sp., the mosquitoes *Culex fatigans* and *Aedes aegypti*, the prevalent black fly, *Simulium quadrivittatum*, and the gnat, *Culicoides*

*furens*, a most annoying species common along the coastal plain of the island.

In all instances the results confirmed initial observations. Usually a more beneficial effect was experienced if treatment were not too long delayed. Nevertheless, a physician whose entire body surface was covered with mosquito bites after a trip to an adjacent island, condescended to try chloroform on a limited area approximately 48 hours after incurring the bites. The relief was so marked that he soon applied the drug on a considerably larger scale.

The dermatologist may present objections to the use of chloroform as a counter-irritant. Of course this substance must be kept from the eyes and mucous membranes. In all tests made no effect other than a transient burning sensation was noted. In one instance a woman long affected with angioneurotic edema, and very susceptible to mosquito toxin, used chloroform to obtain relief over a period of several months. The objective was attained without causing any noticeable change in the edematous condition.

The tests indicated here are obviously not critical ones. It is believed, however, that sufficient evidence has been accumulated to justify calling attention to the palliative potentialities of chloroform against the toxins injected by mosquitoes and other noxious arthropods. It deserves a trial for flea bites and schistosome dermatitis, provided of course, the areas involved in the case of the latter are not too extensive.

W. A. HOFFMAN

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### PRESERVATION OF SAMPLE AREAS IN THE NATIONAL FORESTS

I WOULD like to make a brief reply to Dr. Henry L. Baldwin's communication in *SCIENCE* for June 27, 1941, in which he condemns my criticism in a communication in *SCIENCE* for May 2, 1941, of the failure of the U. S. Forest Service to preserve in the National Forests sample areas exhibiting the finest development of the different types of our primeval forests.

Dr. Baldwin asserts that reservations of "really valuable timber" (whatever that may mean) "have been made by the Forest Service in a large number of cases."

Now what the Forest Service has done and is doing is not a matter of argument but of fact and of record. Either such reservations in the National Forests exist or they do not. If they do, do they contain optimum or near-optimum stands of the wonderful forests of the western United States;—forests unequaled anywhere else in the world, whose unique scenic magnificence as well as scientific interest demanded that adequate areas of the finest stands should be preserved?



Do any permanent reservations of that bureau contain stands of Douglas fir in which the mature trees average 275 feet or more in height; Sitka spruces, western hemlocks, lowland white firs, western white pines or western red cedars 225 feet tall; Port Orford cedars, Ponderosa pines, western larches or Noble firs 180 feet tall or more, to name a few of the species? Hundreds of square miles of stands of timber of such sizes have been sold out of the National Forests.

While the Forest Service has made vast "reservations" of unimportant and commercially valueless areas, a great deal of traveling in the forest regions of the west during past years and recently a number of letters of inquiry have failed to bring out from the

Forest Service any evidence that it is doing much of anything in the preservation of any fine samples of the forests of our western states, though, of all the government bureaus, it alone had the opportunity to accomplish it and was under the deepest obligations to the nation to do so.

The big timber in the National Forests is mostly gone. Only in certain of the National Parks will the Americans of the future be able to see a few small remnants of the wonderful forests of the western United States in their best development.

WILLARD G. VAN NAME

AMERICAN MUSEUM OF NATURAL HISTORY

## SCIENTIFIC BOOKS

### ADVANCES IN ENZYMOLOGY

*Advances in Enzymology and Related Subjects.* Edited by F. F. NORD and C. H. WERKMAN. Vol. I. 433 pp. + 56 illustrations. New York: Interscience Publishers, Inc. \$5.50. 1941.

THE present volume consists of a collection of ten independent articles contributed by investigators from various countries (7 from the United States and one each from Germany, U. S. S. R. and Holland). As stated in the preface, this series of monographs is initiated at a time when research and original thinking are subjected to the gravest of interruptions; it may be difficult to maintain international collaboration in future volumes. According to a letter received by Dr. F. F. Nord, who served as editor of both publications, the aims and scope of the "Advances in Enzymology" are similar to those of the now defunct "Ergebnisse der Enzymforschung."

The ever widening field of enzyme research and the scattering of publications over a large number of scientific periodicals makes it desirable to present from time to time summarizing articles of timely topics by authors eminent in the field. The authors are encouraged to present their own view-point and experimental results and to treat their subject in a critical and synthetic manner rather than in the form of a mere compilation of the literature. In the opinion of the reviewer, the editors, both of whom are well-known investigators in the field of enzyme research, have succeeded in combining in the present volume a number of extremely interesting and valuable articles. While it is impossible to consider in detail each article, a few remarks concerning some of them will be made.

Protein structure is reviewed by Bull. The peptide linkage is considered to be the only important co-valent bond between amino acid residues in proteins. In this connection the theory of peptide chain folding of Wrinch which postulates another type of co-valent

bond is examined in some detail. The x-ray diffraction pictures of fiber proteins and their bearing on the structure of these fibers, particularly that of  $\alpha$ - and  $\beta$ -keratin, are discussed. Bull regards Svedberg's idea of molecular weight classes of proteins (whole number multiples of the unit molecular weight of 17 600) as unfounded. The Bergmann theory of protein structure is based on the concept of molecular weight classes and of a regular and invariant periodicity of occurrence of amino acids in a single peptide chain; the molecular weight is obtained by multiplying the total number of amino acid residues by the average residue weight. Bull points out that the calculation of the average residue weight is uncertain, because the analytical results for individual amino acids in most proteins are not sufficiently accurate at the present time. Other problems discussed are those of the shape of globular proteins, hydration and denaturation.

The article of Bergmann and Fruton is a valuable review of their work on the specificity of proteinases. A good deal of exact information is now available, due mainly to the use of synthetic substrates of known structure and of crystalline enzymes. Pepsin, trypsin and chymotrypsin are regarded as the best defined proteinases. The typical substrates for pepsin and chymotrypsin contain tyrosine or phenylalanine residues; the former enzyme acts at the peptide linkage that involves the amino group of these amino acids, while the latter enzyme acts at the peptide linkages involving the carboxyl group of these amino acids. Trypsin acts at the carboxyl end of lysine or arginine residues. Enzymatic synthesis of single peptide linkages has been effected with a number of proteinases.

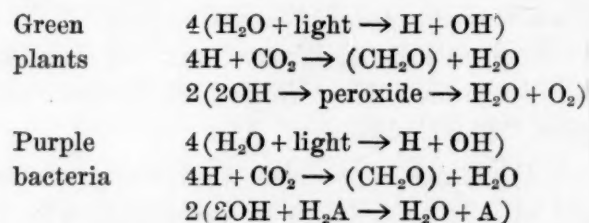
In Lipmann's article on phosphate bond energy, the central theme is that there are two groups of organic phosphate compounds found in nature, a large group with relatively low potential energy in the phosphate bond and a smaller group which con-

tains an energy-rich phosphate bond. To the first group belong all compounds in which phosphate is combined with an alcoholic hydroxyl in an ester linkage, *e.g.*, hexose-, pentose-, triose-, glycerol- and glyceric acid phosphates. The change in standard free energy resulting from the splitting of the ester linkage of this group of compounds is estimated at -2,000 to -4,000 calories. The same numerical values with reversed sign gives a measure of the group potential. The energy-rich phosphate bonds are of the type, P-O-P, N-P, carboxyl-P, enol-P, represented by such compounds as adenosinetriphosphate, creatine and arginine phosphate, phosphoglyceryl- and acetyl phosphate and phosphoenol-pyruvate. The average energy available in these types of linkages is assumed to be 9,000 to 11,000 calories. The following reaction phases are distinguished in the constantly occurring metabolic turnover of phosphate. (1) Introduction of inorganic phosphate into ester linkage. (2) Generation of energy-rich phosphate bonds. (3) Distribution of phosphate by the adenylic acid system. (4) Regeneration of inorganic phosphate. A fine coordination between a great number of enzymatic reactions is necessary in order to avoid obstruction of the phosphate cycle by the accumulation of intermediates. The fall of the phosphate group potential from a higher to a lower level during the metabolic phosphate cycle provides a source of energy which may be utilized for a variety of purposes, *e.g.*, resynthesis of glycogen, mechanical work during muscular contraction, bone formation and various organic chemical syntheses in the cell. Lipmann suggests that a large part of available metabolic energy passes through energy-rich phosphate bonds; this provides a uniform source of energy which can be used for all-around purposes. Transfer of other active groups (amino, amidine, methyl, acetyl) occur quite generally in cellular metabolism. As in the case of phosphate transfer some of these reactions are reversible, while others are not. In the latter case there occurs a decrease in the group potential.

Sumner's article deals with the chemical nature of catalase. Theories concerning the mechanism of catalase action are discussed, especially the theory of Keilin and Hartree which is based on the claim that catalase has a diminished action on hydrogen peroxide in the absence of molecular oxygen. This observation has

not been confirmed by Sumner. He proposes a mechanism in which catalase containing ferric iron forms a peroxide which is decomposed by another molecule of hydrogen peroxide.

There are two articles on photosynthesis, one by Franek and Gaffron and another by Van Niel; the latter deals more specifically with bacterial photosynthesis. Both articles contain a good deal of unpublished material. The quantum efficiency, *i.e.*, the number of light quanta needed for the photochemical reduction of one molecule of carbon dioxide, is discussed at some length. The value of Warburg and Negelein of four quanta per molecule of carbon dioxide has now been superseded by one which is three times as large. The present trend is to interpret photosynthesis in plants and certain bacteria as an oxido-reduction process which may be expressed by the following equations:



Photosynthesis in purple bacteria occurs without liberation of molecular oxygen. The peroxide mechanism in green plants is here replaced by one in which appropriate hydrogen donors (*e.g.*, hydrogen sulfide) regenerate the system. Van Niel suggests that the photochemical decomposition of water with the aid of chlorophyll and special enzymes is the light reaction, while the actual reduction of carbon dioxide is a dark reaction. This does not imply, however, that carbon dioxide itself is the immediate hydrogen acceptor or that it is necessarily converted to carbohydrates.

In other articles Holzapfel deals with the physical chemistry of virus proteins, Green with enzymes and trace substances, Kurssanov with enzymatic processes in living plants and Vonk with digestion in lower vertebrates. The article by Kurssanov summarizes literature not easily accessible in this country, but contains too few technical details to judge the merit of many of the experiments which are reported.

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## SOCIETIES AND MEETINGS

### THE EASTERN SECTION OF THE SEISMOLOGICAL SOCIETY OF AMERICA

THE Eastern Section of the Seismological Society of America held its sixteenth annual meeting jointly with the Section of Seismology, American Geophysical

Union, on May 2, 1941, at Georgetown University, Washington, D. C. The members were welcomed in the name of the president of the university by the Reverend F. W. Sohon, S.J., director of the Georgetown seismic station. Ralph R. Bodle, of the U. S.



Coast and Geodetic Survey, vice-chairman of the section, presided at the meeting because of the absence of the chairman, the Reverend A. J. Westland, S.J., who was still suffering from the effects of an automobile accident.

Fifteen papers and reports were presented. E. L. Perry extended his previous report on "Methods and Operations" to include important information on recording paper; J. Lynch, S.J., aroused much interest by his paper on "Amateur Seismology"; and the New England group, headed by D. Linehan, S.J., gave their results of an intensive study of the New Hampshire earthquakes of December, 1940. B. Gutenberg kindly repeated the seismological part of his paper on "Tectonic Processes" given on May 1 before the Section of Tectonophysics of the American Geophysical Union.

The following officers were elected unanimously for next year: *Chairman*, R. R. Bodle, of the U. S. Coast and Geodetic Survey; *Vice-Chairman*, E. L. Perry, Williams College; *Secretary*, W. A. Lynch, Fordham University; *Treasurer*, H. Landsberg, Pennsylvania State College; *Fifth Member of the Executive Committee*, A. J. Westland, S.J., Spring Hill College.

Georgetown University acted as host to the section at an excellent luncheon that brought the proceedings to a close.

WILLIAM A. LYNCH,  
*Secretary*

FORDHAM UNIVERSITY

#### THE SOUTHEASTERN SECTION OF THE BOTANICAL SOCIETY OF AMERICA

THE second annual meeting of the Southeastern Section of the Botanical Society of America was held in Charleston, S. C., from June 13 to 15, with 41 botanists and their guests participating. Registration was at the College of Charleston. Other institutions cooperating included the Charleston Library Society, which arranged a display of rare botanical works, and the Charleston Museum, custodian of the Stephen Elliott Herbarium.

The program featured tours about the vicinity of Charleston. The botanists were shown work in progress at the U. S. Regional Vegetable Breeding Laboratory by Director B. L. Wade. They were received at Middleton Gardens and also at Middleburg Plantation, the seventeenth century home of E. S. Dingle, bird and flower painter. Other trips included the site of Michaux's garden, the Francis Marion National Forest and Bull's Island of the Cape Romain National Wildlife Refuge. Collecting was done in a variety of southern coastal plain environments, including a cypress swamp, a savannah and a barrier island.

The Charleston Museum was host for an evening's entertainment, where by motion pictures and koda-

slides the botanists were shown scenes from Cypress Gardens, historical Charleston and some of the local flora and bird life.

The business meeting was held after the dinner on Saturday evening. Dr. H. L. Blomquist, retiring secretary, presided, in place of Dr. W. C. Coker, retiring chairman, who had been unfortunately called home. Dr. J. H. Miller, the new chairman, talked on "The Need for Expanding the Botanical Sciences in the Southeastern States." Director E. Milby Burton, of the Charleston Museum, reported on a project to create a park of the Michaux garden site. A resolution was unanimously voted to the effect that the Southeastern Section of the Botanical Society of America endorsed the project and recommended that the administration of the restored Gardens be vested in the Charleston Museum.

In a discussion of the aims of the section it was emphasized that its object was to increase botanical activity and to strengthen the influence of the Botanical Society of America in the South. In furtherance of this object, it was decided to distribute a list of specialists who could assist the members in their taxonomic problems, and to arrange for a breakfast for the section at the Dallas meetings of the Botanical Society.

KENNETH W. HUNT,  
*Secretary*

#### THE ELEVENTH ANNUAL FIELD CONFERENCE OF PENNSYLVANIA GEOLOGISTS

THE eleventh annual Field Conference of Pennsylvania Geologists was held at Johnstown, Pa., on May 30, 31 and June 1. The Pennsylvania Topographic and Geologic Survey acted as host. The committee consisted of State Geologist Dr. George H. Ashley, *chairman*, Assistant State Geologist Dr. R. W. Stone and R. M. Foose and M. N. Shaffner. About fifty geologists attended. Most of these were from Pennsylvania, but Maryland, New Jersey, New York, Virginia and West Virginia were represented.

Registration was on Friday morning, May 30, at the Fort Stanwix Hotel. During the afternoon a trip led by Dr. Ashley, R. M. Foose and M. N. Shaffner visited exposures of the Allegheny formation about Johnstown. The annual dinner was held that evening at the Fort Stanwix Hotel. Dr. Stone acted as toastmaster. Mayor John A. Conway welcomed the members of the conference. The principal speaker was Andrew B. Crichton, local mining engineer, who spoke about the economic aspects of coal in the Johnstown basin, and presented interesting statistics he has compiled on coal reserves in the Appalachian field. Other speakers were: Dr. B. L. Miller, of Lehigh University; Dr. Arthur Bevan, state geologist of Virginia; Drs. F.

M. Swartz and C. A. Bonine, of the Pennsylvania State College; Dr. C. R. Fettke, of the Carnegie Institute of Technology; R. F. Myers, of Muhlenberg College, and Dr. Parke A. Dickey, of the Pennsylvania Survey. E. A. Munyan, of Charleston, W. Va., showed lantern slides of the ninth conference, which was held in West Virginia in 1939.

On Saturday the group was led by R. M. Foose and M. N. Shaffner through the gorge of the Conemaugh River which cuts across the axis of the Laurel Hill anticline exposing all the rocks of the Allegheny, Pottsville and Mississippian series, and the Upper Devonian strata. Of particular interest was the almost continu-

ous section of rocks from the base of the Pottsville series to the Catskill red beds of the Devonian at the northwest end of the gorge. The group was entertained at supper that evening at the home of Mr. and Mrs. Crichton at Westmont.

The trip on Sunday morning was led by Dr. F. M. Swartz. The party drove eastward over the Allegheny Plateau, crossing rocks of the Coal Measures, and descended the Front east of Portage seeing sections of the Mississippian, Devonian, Silurian and Upper Ordovician Systems. The party disbanded near Altoona.

M. N. SHAFFNER,  
Secretary

## SPECIAL ARTICLES

### PREVENTION OF TUMOR GROWTH (CARCINOMA 2163) BY INTRAVENOUS INJECTIONS OF YEAST AND VITAMINS

In 1937 Kinoshita,<sup>1</sup> using dimethylaminoazobenzene (butter yellow), produced liver cancer in rats. Ando<sup>2</sup> reported that the addition of yeast to a butter yellow-rice diet reduced the incidence of liver cancer.

In 1939 Nakahara and his co-workers<sup>3</sup> reported that Vitamins (B<sub>1</sub>, B<sub>6</sub>, nicotinic acid) and their combina-

prevent liver cancers in rats which had been fed butter yellow when a diet of unpolished rice was mixed with 15 per cent. of brewer's yeast.

Recently Rhoads and his co-workers<sup>5</sup> have demonstrated that riboflavin mixed with casein substantially protects the rats against liver cancers. When either riboflavin or casein alone was added to the diet, the incidence of liver cancer was reduced from 100 per cent. to 70-80 per cent. When both substances were

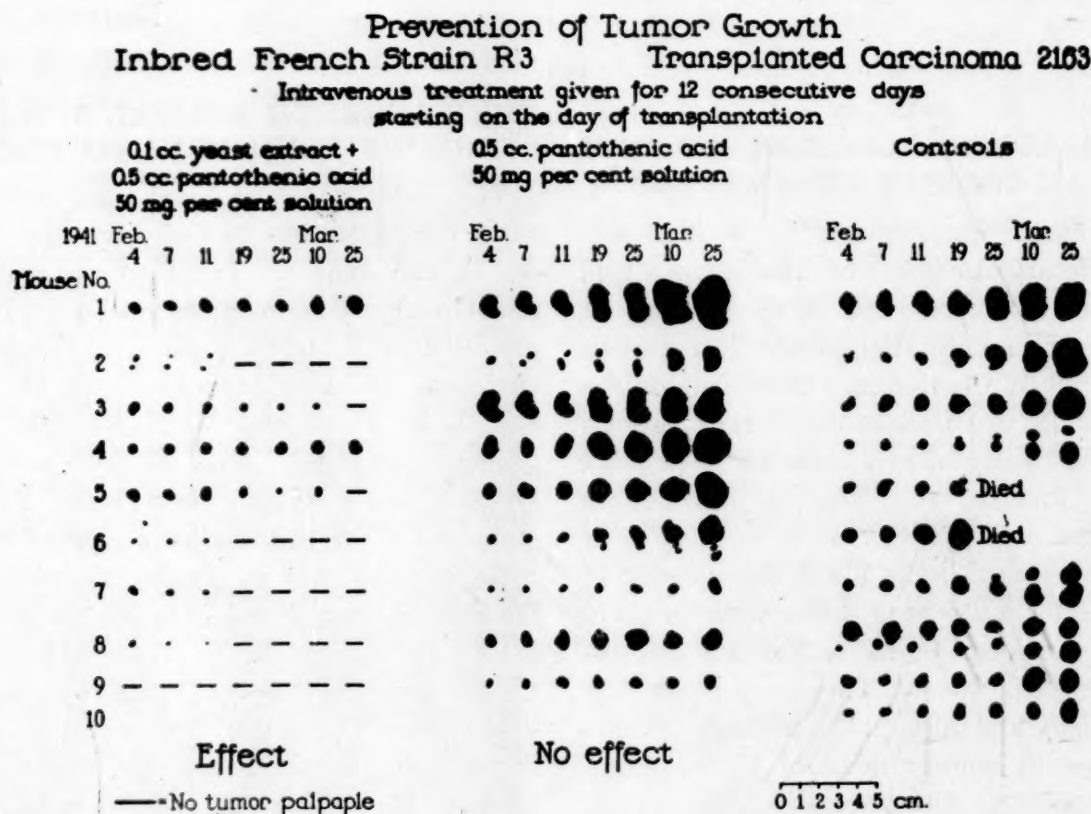


FIG. 1

tions as well as liver eluate and liver-filtrate had no effect on the development of liver cancer.

In 1941 Sugiura and Rhoads<sup>4</sup> showed that they could

<sup>1</sup> R. Kinoshita, *Trans. Soc. Path. Jap.*, 27: 665, 1937.

<sup>2</sup> T. Ando, *Gann*, 32: 252, 1938.

<sup>3</sup> W. Nakahara, T. Fujiwara and K. Mori, *Gann*, 33: 406-427, 1938.

added simultaneously to the diet, the incidence of malignancy was reduced to 3 per cent.

<sup>4</sup> K. Sugiura and C. P. Rhoads, *Cancer Research*, 1: 3-16, 1941.

<sup>5</sup> C. I. Kensler, K. Sugiura, N. F. Young, C. R. Halter and C. P. Rhoads, *SCIENCE*, 93: 308-310, 1941.



In 1938 Maisin and Pourboix<sup>6</sup> had shown that by feeding of yeast they could reduce the percentage of tumors produced by carcinogenic substances.

Since then two papers<sup>7, 8</sup> have been published from this laboratory demonstrating the complete disappearance of spontaneous mammary carcinomas in 30 per cent. of the treated mice following intravenous injections of a watery yeast extract.

In a set of experiments which are the basis of this brief report we tried to influence the takes of a transplanted Carcinoma 2163 in the R III strain. This tumor is a mammary adenocarcinoma which in this

TABLE I

PREVENTION OF TUMOR GROWTH. INBRED FRENCH STRAIN R III. TRANSPLANTED CARCINOMA 2163\*

	No. of animals	Non-takes	Takes
Yeast and pantothenic acid	40	19 (47.5 per cent.)	21
Yeast	30	6 (20 per cent.)	24
Pantothenic acid	40	1 (2.5 per cent.)	39
Controls	40	2 (5 per cent.)	38

\* In the first two experiments (20 animals) the intravenous treatment was started on the day of the transplantation and continued for 10 consecutive days. Since then in these prevention-experiments the intravenous treatment was given on 10 consecutive days and stopped on the day of transplantation.

laboratory was found to be transplantable in 95 to 100 per cent. of animals of this strain, the strain in which it arose. In our experience this carcinoma has proved very resistant to treatment.

The yeast extract for the prevention experiments was prepared as described originally<sup>7</sup> and was given intravenously in doses of 0.1 ccm (containing 4 mg of dry matter). 0.5 ccm pantothenic acid (calcium pantothenate dextrorotary) of a 50 mgm per cent. solution was administered intravenously. 0.5 ccm thiamin of a 50 mgm per cent. solution was used for intravenous application. We obtained these substances through the courtesy of Messrs. Merck and Company.

TABLE 2

PREVENTION OF TUMOR GROWTH. INBRED FRENCH STRAIN R III. TRANSPLANTED CARCINOMA 2163\*

	No. of animals	Non-takes	Takes
Yeast + Riboflavin	29	18 (62 per cent.)	11
Yeast	28	6 (4 per cent.)	22
Riboflavin	29	4 (14 per cent.)	25
Yeast + Thiamin	28	5 (20 per cent.)	23
Thiamin	29	1 (4 per cent.)	28
Controls	29	.....	29

\* Intravenous treatment given for 10 consecutive days before transplantation. Injections were stopped on the day of transplantation.

<sup>6</sup> J. Maisin and Y. Pourboix, *Comptes rend. Soc. biol.*, 127: 1477, 1938.

<sup>7</sup> R. Lewisohn, C. Leuchtenberger, R. Leuchtenberger and D. Laszlo, *Proc. Soc. Exp. Biol. and Med.*, 43: 558-561, 1940.

<sup>8</sup> R. Lewisohn, C. Leuchtenberger, R. Leuchtenberger and D. Laszlo, *Am. Jour. Path.*, 17: 251-260, 1941.

The accompanying charts demonstrate the effects of yeast, different vitamins and combinations of these substances on the prevention of tumor-growth. It is evident that the vitamins (pantothenic acid, riboflavin and thiamin) alone have none or very little effect on tumor growth. Yeast alone prevents tumor growth in about 20 per cent. only. This tumor-preventing effect of yeast was markedly improved by adding pantothenic acid (non-takes 47 per cent.) or riboflavin (non-takes 62 per cent.) to the yeast extract. Addition of thiamin to the yeast extract did not improve the tumor-preventing action.

R. LEWISOHN  
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### EFFECTS OF VITAMIN B<sub>1</sub> ON WOODY EROSION-CONTROL PLANTS<sup>1</sup>

RECENTLY there has been considerable interest in the use of vitamin B<sub>1</sub> for stimulating plant growth. The results reported here are concerned with the relation of added vitamin B<sub>1</sub> (thiamin chloride) to the survival and growth rate of young woody erosion-control plants in the field. By a woody erosion-control plant is meant one that possesses to a high degree the ability to withstand indifferent handling, drought, adverse soil conditions and vigorous competition. For deciduous erosion-control plants, these requirements are best realized by planting seedlings with strong taproots that are large in proportion to the size of the tops and that contain much stored food.

Plantings were made at two locations: (1) On recent sandy alluvial soil in an intermontane valley in the Santa Rosa Mountains, in Riverside County, California. The Santa Rosa planting is in a mountainous mediterranean climate. (2) On primary heavy grassland soil near Capistrano, Orange County, California. The Capistrano planting is in a coastal mediterranean climate, with moderately cool summers. Precipitation during the experimental period was at or above normal.

Seedlings were planted in natural soil in holes dug by shovels to a depth just sufficient to accommodate roots without bending. Soil was filled back into holes and tamped by shovel and by hand. Around each plant a ring of soil was thrown up to form a basin; subsequent waterings were made in these basins from tank wagons. At Capistrano domestic tap water was used; at Santa Rosa water from a surface reservoir was used. Where vitamin B<sub>1</sub> was used in the experi-

<sup>1</sup> Field and clerical assistance was furnished by the Works Projects Administration.

TABLE 1  
PERCENTAGE SURVIVAL OF CONTROL PLANTS AND VITAMIN B<sub>1</sub> TREATED PLANTS AT THE SANTA ROSA SITE IN RIVERSIDE COUNTY, CALIFORNIA

Species	Number of plants		Amount of vitamin B <sub>1</sub> solution* applied (total per treated plant)	Percentage survival of plants on different dates							
	Control	Treated		June, 1939		Oct., 1939		June, 1940		Dec., 1940	
			liters	Control	Treated	Control	Treated	Control	Treated	Control	Treated
<i>Chilopsis linearis</i> ..	12	13	44	100	100	83	75	83	75	83	58
<i>Fraxinus velutina</i> ..	64	66	40	91	85	74	69	70	59	37	23
<i>Gleditsia triacanthos</i> ..	58	60	40	88	73	67	61	61	57	25	32
<i>Juglans hindsii</i> ...	7	7	44	100	100	100	100	100	100	86	86
<i>Prosopis juliflora</i> ..	41	39	44	95	92	74	64	55	39	42	29

\* The solution had a concentration of .05 mg crystalline vitamin B<sub>1</sub> per liter.

ment, it was added at the rate of .05 mg per liter of water.

Species listed in Table 1 were planted April 6 to 15, 1939. All these plants received water at planting time and two weeks later. On these two occasions no vitamin was added. On May 17, 1939, vitamin solution was applied to basins of plants listed in Table 1 as treated plants. On the same date coordinate applications of water were made to control plants. Applications similar to those given May 17, 1939, were repeated June 8, July 10 and August 8, 1939. No further applications were given after August 8, 1939. The total amount of the vitamin solution added to the basin of each of the plants receiving the vitamin is shown in Table 1.

For the Santa Rosa site, Table 1 shows the survival of control plants and of treated plants during 1939 and 1940. The differences between the new shoot

received coordinate applications of water to which no vitamin was added. Applications of water (no vitamin added) to control plants and of vitamin solution to treated plants were given on May 1, May 24, June 20, July 20 and August 14, 1939. No further applications were given after August 14, 1939. Total amount of the vitamin solution added to the basin of each of the plants receiving the vitamin is shown in Table 2.

Table 2 shows the percentage survival of control plants and of treated plants in the test at Capistrano. No significant differences were found in the new growth of the treated plants and of the control plants at the Capistrano site.

**Conclusions:** For the plants tested, no marked beneficial effects were found in the initial survival or initial growth rate by adding vitamin B<sub>1</sub> in water (in concentration of .05 mg per liter of water) to the soil sur-

TABLE 2  
PERCENTAGE SURVIVAL OF CONTROL PLANTS AND VITAMIN B<sub>1</sub> TREATED PLANTS AT THE SAN JUAN CAPISTRANO SITE IN ORANGE COUNTY, CALIFORNIA

Species	Number of plants		Amount of Vitamin B <sub>1</sub> solution* applied (total per treated plant)	Percentage survival of plants on different dates							
	Control	Treated		July, 1939		Feb., 1940		July, 1940		Jan., 1941	
			liters	Control	Treated	Control	Treated	Control	Treated	Control	Treated
<i>Acacia farnesiana</i> .....	18	18	48	100	100	100	100	100	100	100	100
<i>Chilopsis linearis</i> .....	27	27	96	100	100	96	96	96	93	93	89
<i>Juglans hindsii</i> .....	26	26	96	100	100	100	100	100	100	100	100
<i>Juglans hindsii</i> × <i>J. regia</i>	10	10	96	100	80	100	80	100	80	100	80
<i>Olea verrucosa</i> .....	9	9	96	100	100	100	100	100	100	100	100
<i>Prosopis juliflora</i> .....	27	27	96	100	100	93	100	93	100	93	100
<i>Simmondsia californica</i> .	27	27	48	100	100	89	81	89	70	89	70

\* The solution had a concentration of .05 mg crystalline vitamin B<sub>1</sub> per liter.

growth of the treated plants and of the control plants were not significant at any time during the test at Santa Rosa.

The species listed in Table 2 were planted April 10 to 20, 1939. The plants grown at this Capistrano site differ in their treatment from those of the Santa Rosa site. At the Capistrano site vitamin solution was applied immediately after planting to the basins of treated plants. Control plants at planting time re-

rounding the plants. The data on survival suggest that added vitamin B<sub>1</sub> may have had, under the conditions of the experiment, an adverse effect on the survival of some of the species tested.

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## TACONIC ALLOCHTHONE AND THE MARTIC THRUST

THE significance of the stratigraphic contrasts in the Ordovician sediments of the Taconic Allochthone and the autochthone of the Champlain Belt in western New England and eastern New York long has been appreciated.<sup>1</sup> The fauna of the "Martinsburg shale" at Harrisburg, Pennsylvania, as listed by Stose,<sup>2</sup> includes "Deepkill" and "Normanskill" graptolites that are known only in the allochthonous Ordovician shale facies in New York, Quebec and Newfoundland. Inasmuch as the shales in Pennsylvania lie in the Great Valley belt of lower Ordovician equivalent carbonates, just as the Taconic Allochthone lies on carbonates of the Champlain Belt, it seems probable that the lower Ordovician shales at Harrisburg are in an outlier of thrust sheet. They may be in a klippe of the Martie overthrust sheet, the sole of which forms a continuous but sinuous fault line some 30 miles southeast of Harrisburg<sup>3</sup>; the minimum displacement would be comparable but less than that of the Taconic Thrust in the latitude of Albany.<sup>4</sup> Suggestion that ultrabasic rocks in the Piedmont are comparable to those east of the Green Mountains in the Taconic Allochthone has been stated.<sup>5</sup>

The writer has re-examined the Arvonian slate in the Martie thrust block in Virginia. Ordovician fossils have been collected from the slate<sup>6</sup> and from the similar

Quantico slate near Washington,<sup>7</sup> and both slates have been correlated with the Peach Bottom slate of Pennsylvania.<sup>8</sup> The Arvonian basal quartzite clearly unconformably overlies granite gneiss intrusive in the Wisahickon schist,<sup>9</sup> the latter in the main belt of the Glenarm series, demonstrating the pre-late Ordovician age of the Glenarm, and suggesting that it is Pre-Cambrian. The magnitude of the thrusting across the paleogeographic Quebec Axis would account for the contrast between the Paleozoic sedimentary sequence in the Martie thrust block and the contiguous autochthone.

A complementary induction is that the Manhattan schist and subjacent Inwood marble and Fordham gneiss and marble in New York, which have been uniformly correlated with the Glenarm sequence, lie above the sole of the Taconic-Martie thrust. Thus a thrust should pass north of the continuants of the New York City rocks and south of the gneisses of the Hudson Highlands, on which an autochthonous section is preserved.<sup>10</sup> The intense mechanical alteration of the Cambro-Ordovician carbonates of the autochthonous sequence on the south flank of the Highlands is compatible with the view that they lie below but near the sole of the thrust. The Taconic thrusting accompanied the Taconian Revolution, and is certainly pre-late Silurian, probably pre-Silurian.<sup>11</sup>

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## SCIENTIFIC APPARATUS AND LABORATORY METHODS

### THE DETERMINATION OF AMINO ACIDS OF THE DEXTRO OR UNNATURAL CONFIGURATION

THE increasing interest in the occurrence of amino acids of unnatural configuration warrants the preliminary description of a simplified method for their quantitative determination. The general usefulness of the d-amino acid oxidase of Krebs<sup>1</sup> as a specific reagent for this purpose has been demonstrated by Lipmann, Behrens, Kabat and Burk.<sup>2</sup> Whereas, their procedure is dependent upon the measurement of oxygen consumption in the Warburg apparatus, the same

result may be accomplished by determining with the highly sensitive reagent, 2,4-dinitrophenylhydrazine, the alpha keto acid formed in the enzyme reaction. This method which has proven extremely rapid necessitates only the use of an incubator and a colorimeter.

The enzyme oxidation is carried out by placing 1 to 2 ml of the unknown solution, adjusted to pH 8.0, in a 125 ml erlenmeyer flask. 2 ml of the d-deaminase<sup>3</sup> in M/60 sodium pyrophosphate at pH 8.0 are added, the flask quickly flushed out with a slow stream of oxygen and tightly stoppered. After incubation at 38° (without shaking) the mixture is transferred quantitatively with gentle suction into a 10 ml volumetric flask containing 1 ml of 20 per cent. trichloroacetic acid. The

<sup>7</sup> T. L. Watson and S. L. Powell, *Amer. Jour. Sci.*, 4th ser., 31: 36-41, 1911.

<sup>8</sup> A. I. Jonas, *Virginia Geol. Surv., Bull.* 38: 25, 1932.

<sup>9</sup> Stephen Taber, *Virginia Geol. Surv., Bull.* 7: 41, 1913.

<sup>10</sup> C. P. Berkey and Marion Rice, *New York State Museum Bull.*, 225-226: 62-64, 1921.

<sup>11</sup> G. M. Kay, *op. cit.*, 287-288; *Bull. Geol. Soc. America*, 51: 1932, 1940.

<sup>3</sup> E. Negelein and H. Bromel, *Biochem. Zeit.*, 300: 225, 1939, Step 1.

<sup>1</sup> Arthur Keith, *SCIENCE*, n. s., 35: 310, 1912.

<sup>2</sup> G. W. Stose, *Bull. Geol. Soc. America*, 41: 640-641, 1930.

<sup>3</sup> G. W. Stose and A. I. Jonas, *Pennsylvania Geol. Surv., 4th ser., Bull.*, C67: 149-158, 1939; Ernst Cloos, *Bull. Geol. Soc. America*, 51: 860-861, 1940.

<sup>4</sup> G. M. Kay, *Bull. Geol. Soc. America*, 48: 286, pl. 5, 1937; C. Schuchert, *ibid.*, 48: 1028, 1937.

<sup>5</sup> H. H. Hess, *Bull. Geol. Soc. America*, 51: 1996, 1940.

<sup>6</sup> N. H. Darton, *Amer. Jour. Sci.*, 3d ser., 44: 50-52, 1892.

<sup>1</sup> H. A. Krebs, *Biochem. Jour.*, 29: 1620, 1935.

<sup>2</sup> F. Lipmann, O. K. Behrens, E. A. Kabat and D. Burk, *SCIENCE*, 91: 21, 1940.

solution, which quickly flocculates, is diluted to volume and filtered.

To 1 to 5 ml is added 1 ml of 2,4-dinitrophenylhydrazine, half-saturated in N. HCl. After 10 minutes 10 ml of 2 N. NaOH are added and the solution diluted to 25 ml and read in the Klett-Summerson<sup>4</sup> photoelectric colorimeter using the green filter number 52. The blank value (zero time of incubation) is subtracted and the amount of keto acid is read from a calibration curve in order to calculate the content of d-amino acid.

With the more slowly reacting amino acids longer time of incubation or decreasing amounts of the unknown solution have made it possible to obtain maximum values, as shown by the following recoveries. With 10 micro mols of d-alanine 98 per cent. was recovered as pyruvic acid in one hour and with 10 micro mols of d-phenylalanine 85 and 98 per cent. were recovered in 3 and 4 hours, respectively. Using only 5 micro mols of the latter a value of 103 per cent. was obtained in 3 hours of incubation.

The method described has proven particularly useful in determining the unnatural amino acids in various biological materials such as tissue hydrolysates and urine even in the presence of large amounts of members of the levo series. The acyl derivatives in urine have also been readily determined after submitting the samples to a preliminary hydrolysis. Its successful use in other instances and with other amino acids is dependent only on the formation of a stable keto acid and the ability of this keto acid to yield a colored 2,4-dinitrophenylhydrazone in alkaline solution. Other aspects of the use of this method and the results obtained will be described in detail elsewhere.

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### A NEW METHOD OF PLANT PROPAGATION<sup>1</sup>

A NEW method of rooting plant cuttings without sand, peat, soil or other solid media has been under investigation since early January of this year. Based on the principle that cut stems suspended in the very moist atmosphere of a specially constructed box can develop perfectly normal roots, the method has already given promising results.

The experimental boxes are approximately 3 feet tall, 2 feet wide and 1 foot deep. Each box has a glass front and back; the former is set in grooves so that it can be opened to permit air circulation, and the latter is kept closed but enables observation of root develop-

<sup>4</sup> The author is indebted to Mr. R. J. Bott of the Will Corporation for the loan of an extra Klett-Summerson photoelectric colorimeter for the purpose of working out this method.

<sup>1</sup> Journal Series paper of the New Jersey Agricultural Experiment Station, Rutgers University, department of plant pathology.

ment and of the moisture content in the back of the box. One-inch square removable shelves, made of ordinary builder's lath, are placed in a horizontal position about half-way in the box. A half-inch opening is left between shelves, and vertical wooden strips are nailed on the sides of the box in front of the shelves to hold the shelves in place. A large piece of sheet rubber, with holes of the size of the cuttings to be inserted, is fitted securely immediately behind the shelves. The rubber functions to confine the moisture in the back of the box where it is most needed and to keep the cuttings in place. A water trough in the upper back part of the box from which strips of absorbent cloth are suspended, supplies the moisture necessary to maintain the high humidity.

Successful rooting of a number of popular ornamentals, including *Achyrantes*, *begonia*, *chrysanthemum*, *coleus*, *geranium*, *perennial phlox*, *ivy* and *Philodendron* was achieved by this method in less than three weeks. Such plants were then successfully transplanted to soil in pots and have continued to develop normally. Dormant hardwood cuttings were placed in similar boxes in late January and early February. Vigorous roots developed in 6 to 8 weeks on *Hydrangea grandiflora*, *Deutzia crenata* and *Philadelphus coronarius*. These plants were also successfully transplanted to soil and have continued to grow normally.

In all the experimental boxes thus far used, root development was greatest in the vicinity of high moisture content and was either poor or entirely absent in those parts of the boxes where the atmosphere was relatively dry. With improvements in methods of maintaining a saturated atmosphere in the vicinity of the cut stems in the back of the box, this new method promises to be useful not only to commercial growers but also to the amateur propagator. The special type of box in which the present investigations were conducted is tentatively called the "Rutgers Aero-propagator."

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NEW JERSEY AGRICULTURAL  
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### BOOKS RECEIVED

- Bicentennial Conference, University of Pennsylvania. *Cytology, Genetics and Evolution*. A symposium. Pp. 168. Illustrated. \$2.00. HENDERSON, LAWRENCE. *The Study of Man*. Pp. 22. \$0.25. GREGORY, WILLIAM K., B. HOLLY BROADBENT and MILO HELLMAN. *Development of Occlusion*. Pp. 72. 19 figures. \$1.50. University of Pennsylvania Press.
- ELDER, ALBERT L. *Laboratory Manual for General Chemistry*. Pp. x+259. Illustrated. Harper. \$2.00.
- GRIER, MARY C. *Oceanography of the North Pacific Ocean, Bering Sea and Bering Strait; A Contribution toward a Bibliography*. Pp. xxii+290. University of Washington, Seattle.
- LOEB, LEONARD B. and JOHN M. MEEK. *The Mechanism of the Electric Spark*. Pp. xiii+188. 43 figures. Stanford University Press. \$3.50.